POLICY, STRATEGY AND IMPLEMENTATION MASTER PLAN

FOR

CONSOLIDATING RESEARCH AND EDUCATION NETWORKING IN AFRICA (CORENA)

APPROVED BY THE 12TH BOARD MEETING, 19TH FEBRUARY 2009

FOREWORD

UbuntuNet Alliance has been mandated by member NRENs with the critical objective of ensuring that researchers and educators within its membership region have equity of access, in terms of quantity and cost, to the global information infrastructure and the international research and education community. We have dubbed this major undertaking "Consolidating Research and Education Networking in Africa (CORENA)".

Success in this kind of continental endeavour requires that we develop a coordinated roadmap on the basis of what already exists on the ground, the opportunities available and the challenges we are likely to face. In essence this has been the major undertaking during 2008 when the Alliance, through research studies and consultations, established a comprehensive planning database, defined policy and reviewed its strategic plan. The result is this document that captures the policy, strategy, and master plan for realizing our key objectives.

This process would not have been successfully completed without the support of our many development partners. In particular, we are most grateful to the International Development Research Centre of Canada (IDRC); the Open Society Institute of Southern Africa (OSISA); and the Andrew Mellon Foundation's fund for Fostering Research and Education Networking in Africa (FRENIA), through TENET, for their continuing assistance.

Prof Zimani Kadzamira
Chairman, UbuntuNet Alliance

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1. BACKGROUND

UbuntuNet Alliance for Research and Education Networking (UbuntuNet) started during 2005 as an idea among the representatives of existing and nascent National RENs (NRENS) in Eastern and Southern Africa, driven by the need to increase intra-African research and education networking at the infrastructure level, and to secure sufficient and affordable access to the GII.

We believe that while they possess significant human capacity, the contribution of African universities and research institutions especially to national human development is still very limited. They also do not feature significantly at the intellectual property output level, creating a huge intellectual property deficit on the continent: Africa remains predominantly a consumer of intellectual output from other regions. While we recognize that these short-comings are multi-faceted challenges, we assert that a major component of the challenges is the fact that while most of the world lives in the information and knowledge age driven by easy and cheap access to the global information infrastructure (GII), African institutions still remain isolated both nationally and internationally through lack of sufficient and affordable connectivity.

The stated objectives of UbuntuNet Alliance in the deed of incorporation are to, on a non-profit basis:

- Develop and improve the interconnectivity between REN participants in the membership region and their connectivity with the research and education networks worldwide and with the Internet generally;
- To develop the knowledge and skills of ICT practitioners in these institutions; and
- Provide related auxiliary services to REN participants.

During the year 2008, UbuntuNet Alliance reviewed its Strategic Plan to generate the Dar es Salaam Strategic Plan of October 2008. The Alliance also, through various studies set up an information database and developed a Master plan for UbuntuNet Alliance, guided by specific policies as discussed by the Board. This document captures the guiding policy as well as the Master Plan for UbuntuNet Alliance, providing a ready reference for ongoing implementation as well as monitoring, evaluation, and review. We capture our dreams, vision, and plans under the broad title of ***"Consolidating Research and Education Networking in Africa (CORENA)".***

2. KEY POLICY STATEMENTS

The following policy statements capture the broad intent of UbuntuNet Alliance in terms of institutional growth and infrastructure establishment and operations.

It is the policy of the Alliance:

To always function as an organization characterized by:

- Being member-driven and retaining its membership through value offered in a businesslike environment.

- Respect for the independence of its members
- Members who respect and abide by the norms approved by the membership through the Council of Members.
- Functioning as a lean organization with low overheads

To implement inter-connectivity among its member NRENs and to the rest of the world with bandwidth, quality, and cost compatible with the rest of the global research and education community.

To provide distance-neutral access cost to all member NRENs

To promote and support the growth of a continental network

To work with other Regional RENs in Africa through not for profit business relationships and interconnectivity that will lead to continental coverage of interconnected NRENs.

To ensure sustainable operations through the charging of membership and agency fees that will cover all the recurrent costs.

3. ORGANISATIONAL STRUCTURE

UbuntuNet Alliance will deliver its service through a lean structure consisting of four key officers with the following major functions:

i. The Chief Executive Officer

Core functions: Strategic Plan implementation and monitoring; Organisational management; Public Relations - key point of contact with stakeholders and development partners; Project formulation and proposal development; Project implementation; Support to the Board

ii. The Technical Manager

Core functions: Network design and implementation; Management, control, and maintenance of core and ancillary ICT resources; Contact point for all technical outsourced services and service providers; Support to the UbuntuNet Engineering Task Team

iii. The Services Manager

Core functions: Formulation and Management of Service Level Agreements; Implementation and supervision on Help Desk services, including any such outsourced services; Internal follow up to ensure achievement of agreed service levels; Operational interface with the member NRENs

iv. The Finance and Administration Manager

Core functions: Oversight of all financial operations; Contact point for outsourced Technical Financial Management functions/operations; Management and reporting on grants; Financial reporting; Human resource management; Administration; Meetings and conferences.

Technical Finance management functions will be initially from the University of Malawi that, for the next two to three years, is expected to be the main contracting entity on behalf of UbuntuNet Alliance.

Other positions below the levels given in Figure 1 is will be filled according to need as agreed by the Board. The only position specified at the time approving this Master Plan is the position of Accountant who will be responsible for the technical aspects of book-keeping and financial records management, and supporting the financial management role of the Finance and Administration Manager.

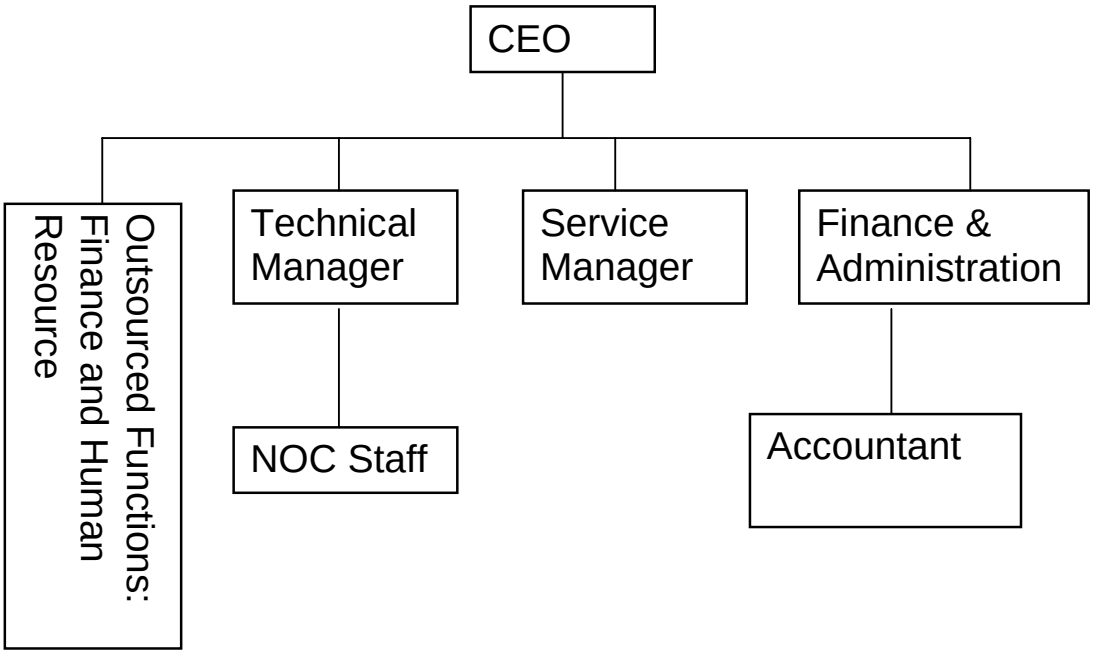

Figure 1: UbuntuNet Organogram

UbuntuNet is a young organization. It is therefore planned to have ad hoc training positions as approved by the Board in order to develop capacity for the layer of positions below the Managers.

It is the policy of the Alliance to only establish those positions where it is more cost-effective to do so than to outsource. Such established positions will always be motivated by the core rather than the support functions within the alliance. The Alliance will, through benchmarking and other measures, set percentage ceilings on expenditure to human resource costs in terms of the overall recurrent budgets, both core and non-core.

4. THE BUSINESS MODEL

The business model of UbuntuNet Alliance is defined by the following key principles:

i. The Alliance is a not-for profit organization.
ii. The Alliance will charge an agency fee to its members. This fee will cover all recurrent costs and leaves a modest operating and capital equipment reserve. Bandwidth consumed will be used as the basis for a pro-rata determination of the agency fee payable by each member NREN.
iii. The support of development partners will be sought only for capital costs (this includes long-term procurements like Indefeasible Rights of Use (IRUs)).
iv. The agency fee will be location independent. Specifically, there will be no distance-based discrimination of fees payable.
v. Transparent pricing models will be used by suppliers of services to the Alliance and for services offered by the Alliance to members. It is appreciated that many member NRENs that will provide services to UbuntuNet do not yet have the capacity to carry out the costing and pricing: In its transparent approach, the Alliance will give theme the support necessary to build such capacity, including, where necessary, the provision of expert support. Specific services to be bought from NRENS include hosting of the Layer 3 POPS; Transit capacity on backbone links; and capacity on international circuits
vi. Services related to operations will be outsourced, except where it makes economic and business sense to recruit part-time or full-time staff to carry out the required functions.
vii. The owners of any shared resource will determine how that resource is managed.

The services for which the Alliance will charge fees (as key elements of the agency fee) will include:

i. The core business of regional transit within Africa and international transit to other regional RENs.
ii. Value added services including capacity building, NOC services, support to content networks, and advocacy

In addition to the service fee, UbuntuNet Alliance will charge an annual membership fee as will be agreed from time to time by the Council of Members,

5. INFRASTRUCTURE VISION AND PROJECTS

Infrastructure Vision

It is the policy of the Alliance to implement inter-connectivity among its member NRENs and to the rest of the world with bandwidth, quality, and cost compatible with the rest of the global research and education community. To achieve this, the Alliance will seek, through donation or procurement, fibre-capacity that will enable its member NRENs regional and international transit of a quality and cost compatible with the rest of the world.

The Cluster approach

The size of the UbuntuNet membership region, and the diversity in policy, regulation, socio-economic development, governance, and required investment make it unrealistic to implement a regional network using a monolithic approach. It is the policy of the Alliance to use a cluster based-approach to development of the network, permitting segments of the network to develop independently based on a common architecture and interface standards, as well as an infrastructure vision that covers the entire region. The clusters are not defined based on any political or economic grouping, but through network logic and ease of realizing each segment.

Two clusters have been identified as illustrated in Figure 2: The Eastern Cluster, covering Sudan, Ethiopia, Eritrea, Djibouti, Somali, Kenya, Uganda, Tanzania, Rwanda, Burundi, and DRC; and the Southern Cluster, covering DRC, Angola, Zambia, Tanzania, Malawi, Mozambique, Zimbabwe, Namibia, Botswana, Swaziland, Lesotho, and South Africa. It should be note that the cluster concept permits a large country (eg Tanzania and DRC) to be in two clusters for the purposes of establishing connectivity in different regions of the same country.

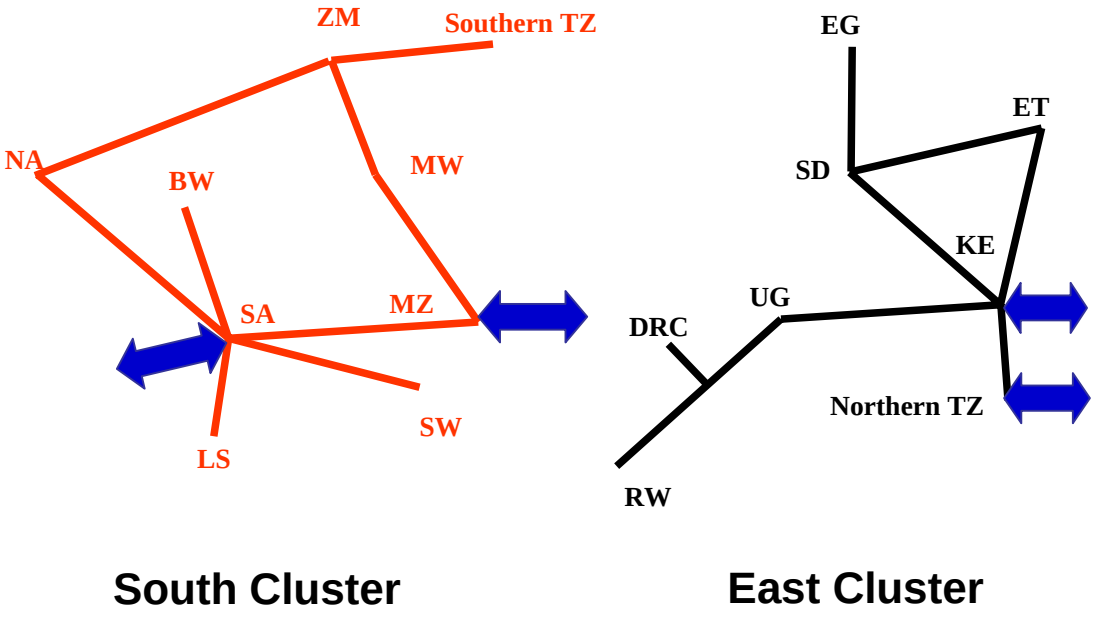

Figure 2: The Cluster Approach

While the focus is on fiber, the Alliance recognizes that for at least the next five years, many universities of the UbuntuNet member NRENs will continue getting international and regional connectivity vi VSAT. Plans therefore include the implementation of virtual RENs (VRENs) enabled through connectivity via VSAT hubs in Europe to the UbuntuNet Router in London. This router was indeed located in London in recognition of the fact that, as long as the majority of countries in the membership region are connected via VSAT, the easiest and most cost-effective point of common connection is within Europe where the hubs are located.

The network as envisaged will therefore consist of:

i. A regional network, consisting of cross-border connections and layer 2 capacity in each member country.
ii. Layer 3 switches as points of presence in each country
iii. Virtual NRENs based on VSAT providing connectivity for institutions that have access only via VSAT.
iv. Submarine cable running along the Indian Ocean coastline of Africa as part of the regional transit backbone.
v. International connections via submarine optical fiber.

Figure 3 show the vision of the regional network, and Figure 4 the VREN concept.

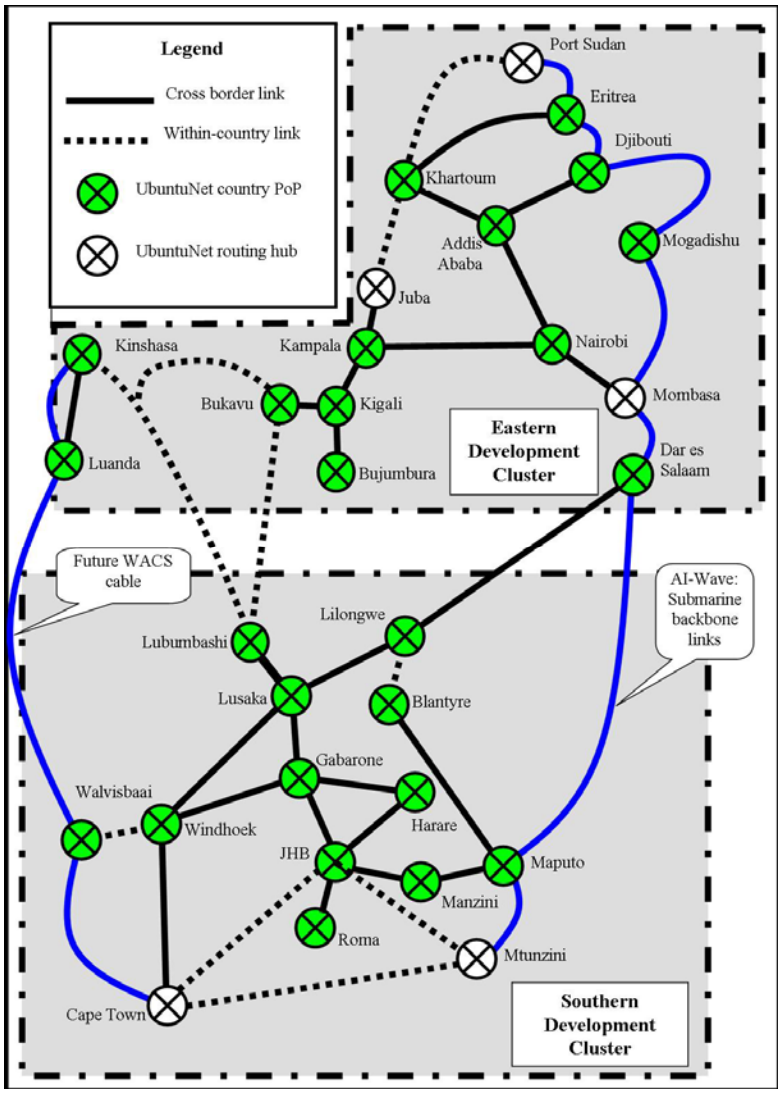

Figure 3: Regional Backbone Vision

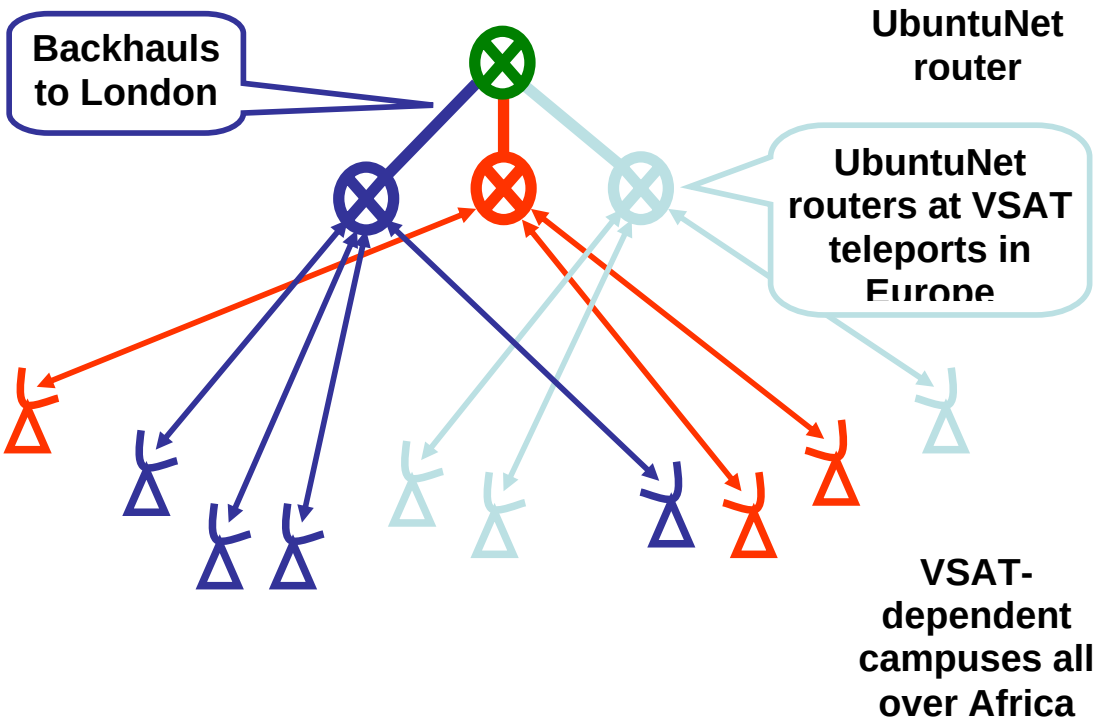

Figure 4: The Virtual REN (VREN) Concept

5.2 Infrastructure Projects

The Alliance has identified the following major projects through which the infrastructure vision will be realized:

i. Project 1: The Virtual REN (VREN)
ii. Project 2: The Regional backbone
iii. Project 3: International Connectivity
iv. Project 4: Network Operations Centre
v. Project 5: Africa-Indian Ocean wave (AI-Wave)

5.2.1 The Virtual REN Project

This project is aimed at connecting NRENs (or their nominated members) that use VSAT for international access to the UbuntuNet Router in London. The project will address, in the short-term, the challenge of establishing connectivity of NRENsto the international research and education community through the UbuntuNet Router in London. It will, in the medium term, continue enabling those NRENs that do not have access to international fiber backbone to get to the London UbuntuNet POP.

We have defined a VREN as a research and education network based on access via VSAT consolidated through the teleport of a satellite service provider. This necessarily means that each VREN is physically identified by the VSAT provider, the satellite they use, and the teleport. At the NREN level, this will be actualised through a common contract with a

vendor instead of individual contracts. This offers better price; more flexibility (joining and departure; and bursting into available bandwidth).

VRENs shall be aggregated by UbuntuNet through direct circuits or tunneling to a common point (the London Router).

UbuntuNet will install a Layer 3 edge router at the teleport – established as Fuchsstadt, Germany for Intelsat and Nittedal, Norway for Taide. Intelsat and Taide have between them the largest numbers of university/research institution users within the UbuntuNet membership region. This router at the teleport will be the first Layer 3 device the NRENs see. The router sends packets to the router in London from where they are sent to Géant or to the commodity internet according to type.

In setting up VRENs, UbuntuNet will not compete in NREN territory: Only the NRENs will be the clients, though these may nominate individual universities to deal directly with the Alliance. The contract between UbuntuNet and the satellite service provider will provide for the User to be the customer and UbuntuNet to be the User's agent

5.2.2 The UbuntuNet Regional Backbone

The regional backbone is aimed at ensuring regional connectivity so that:

- Local traffic within the sub-region is kept local;
- Cross-border connections are transparent and cost-neutral to the NREN community;
- All landlocked countries have access to the international (i.e, external to Africa) fiber landing points;
- Charges to NRENs are independent of geographic location (i.e, no distance-dependent charges to NRENs)

A key factor in the implementation of the Regional Backbone is the sector policy and regulatory environments that vary widely from country to country within the region. From a situational analysis conducted, we have noted that the policy and regulatory environment has been becoming increasingly amenable to NREN activity: There is now leeway, in many cases, for regulators to make dispensation to NRENs. While this is not the ideal, it is a positive starting position. The challenge is now in getting the NRENs to engage policy makers and regulators to take favourable decisions on:

- Granting international gateway licenses to the NREN. Most of the membership counties permit this for VSAT, but a few do not. The position on fibre as an international gateway is not explicitly addressed in many instances, but there should be no policy barrier in countries where VSAT is permitted.
- Approval of cross-border connectivity that enables UbuntuNet(through its membership) to operate like a multi-nation corporate enterprise with its own virtual or real network.

The need for cross-border links in multiple regulatory environments would call for

multiple contracts and also require UbuntuNet to have legal corporate existence in each country. To avoid that, UbuntuNet has adopted a policy of working through NRENs to secure and manage the transit routes. To each NREN on either side of border, UbuntuNet will offer a sizable once-off payment to enable the two NRENs to jointly provide UbuntuNet with cross-border IRU capacity. UbuntuNet will contract directly with suppliers only where it makes better business sense.

A pre-condition for setting up each cross-border connection as an element of the UbuntuNet regional network will be the existence in-country fiber on either side on which each NREN has got sufficient capacity to dedicate at least 10Gbps to transit and cross-border connectivity. (With modern equipment, this calls for just one wavelength: An NREN would then have at least two wavelengths, one of which it would dedicate to transit and cross-border traffic).

The Alliance will take an opportunistic approach to the exploitation of existing and emerging fibers, and will to this continuously monitor changes in policy and regulatory environments that permit existing fiber to come on line, plans and projections for the rollout of new fiber, and key individuals and organizations through which free or concessionary access to fiber can be secured.

5.2.3 International Bandwidth Project

This is aimed at securing connectivity to the international research and education community through fiber at prices comparable to Northern America, Europe, and the Pacific countries so as to remove the bandwidth limitation to the international competitiveness of Africa-based researchers and academics.

The approach to securing international bandwidth will also be opportunistic as discussed under the Regional Backbone Project. In addition to this, UbuntuNet will actively market the region as a destination for other regional and international RENs, inviting them to meet us in Africa at the fiber landing points as opposed to the current approach that African RENs should meet the more established RENs in Europe or the Americas, subsequently bearing the full cost of international connectivity to those continents.

In order to achieve equity, emphasis will put on getting concessionary (outright donation or payment of a small fraction of the commercial cost) bandwidth in the form of dark or lighted IRUs.

5.2.4 Network Operations Center Project

The objective of Network Operations Center (NOC) Project is to ensure the service level agreements are fulfilled through proactive monitoring and resolution of any network glitches that can militate against this. This includes involves remote layer 3 management and layer 2 monitoring, in each case triggering corrective action through the NOC itself or through NRENs and other outsourced service providers. The NOC will also provide the Help Desk function that may be outsourced.

The key functions of a NOC are:

i. Layer 3 Management (remote). (This is currently handled by TENET for the UbuntuNet routers in London and Johannesburg).

ii. Technical support for user RENs
iii. Layer 2 Management and operations through the NRENs as suppliers of Layer 2 links (NRENs themselves must be able to see the entire system).
iv. Help Desk operating as a 24x7 call centre and real status reporting centre

To define the lines of communication, each member NREN will designate a person or persons (if the latter in hierarchical order) to be the point of contact with the NOC.

Operational Strategy

While the responsibility of assuring network and services availability within the agreed service levels remains with NOC, it is the policy of the Alliance to outsource specific operations based on economics. Three possible scenarios exist:

i. No investment in equipment and reliance on a fully outsourced service;
ii. Procurement of equipment and outsourcing operations
iii. Procurement of equipment and use of own employees.

The decision, for each aspect of NOC operations will be determines by three factors:

i. Which approach is the most cost-effective?
ii. What is the level of private sector competence and resources vis a vis the required services?
iii. Can the service level be assured?

Based on experiential sharing, UbuntuNet has adopted a provisional decision to directly handle key functions (i) and (ii) above, and outsource functions (iii) and (iv). This will be reviewed over time as sufficient data is obtained to take a clear economic decision.

In recognition of the cluster approach, and later the need for back-up and disaster recovery services, two NOCs will be established: one in the Eastern and the other in the Southern clusters. The provisional locations are Nairobi and Johannesburg respectively.

5.2.5 The African Indian Ocean Wave (AI-Wave) Project

The AI-Wave Project is aimed at implementing a sea-based regional backbone following the Indian Ocean along the African coast. Strictly speaking, this is part of the Regional Backbone Project, but has been treated independently because of its unique requirement.

The current regional protocols permit land-locked countries access to the cable landing points. This creates opportunity for making the cable landing stations points of interconnection and routing the regional backbone traffic along an ocean based path without all the policy and regulatory challenges of cross-border operations. It is this ocean based path we have dubbed the African-Indian Ocean Wave, or AI-Wave.

The AI-Wave will be established through 10Gbps circuits connecting Port Sudan, Djibouti, Eritrea landing point, Mogadishu, Mombasa, Dar es Salaam, Maputo, and Mtunzini. The potential suppliers of this connectivity, based on current cable plans, are EASSy and SEACOM.

6. GENDER ISSUES

It is the policy of the Alliance to always integrate effective gender approaches in all its plans. The development of a gender policy as well as the integration of gender in the implementation master plan and operations will be a priority activity during the first six months of 2009. Based on a preliminary review, the Gender Analysis Grid under development by IDRC could be customized, guided by an expert, to address gender mainstreaming into the Alliance plans and operations.

7. RISKS AND MITIGATION

7.1 The Multi-stakeholder environment

The multi-stakeholder easily constitutes the highest risk: the success of the project is highly dependent on continuing engagement and ownership of the project by a multiplicity of stakeholders. Stakeholder engagement and activities related to this will be a continuing area to watch during implementation in order to minimise the risk. The project has also been designed such that, as a minimum, sub-regional success can be achieved.

7.2 Governance

The governance challenge is related to the multi-stakeholder environment and the necessarily sometimes divergent interests. The worst case scenario would occur if members of the Board see themselves as representing interest groups.

The UbuntuNet Board will have a key role in addressing the risk here. The Board is set up such that the members represent the broader view and benefit rather than as a representative board. The nomination of the Chair is by the Association of African Universities helps to locate the Chair at a continental level, isolating this key position from the immediate influence of members. Provided the individuals identified are people who have the regional benefit as their vision, the governance risk will be minimised.

7.3 Financial

This is a major undertaking with major outlays. We want to deliver equality, not just equity, in access to international and regional research and networking bandwidth to African institutions. Equality must be in terms of quantity and cost.

Financial risk will be highest in the initial years before a combination of international competing fibre; national competing fibre; and good policy and regulation around access and competition ensure the required equity. It is during this period that we ask funding development partners, and others like IEEAF who have the means to secure donated capacity, to step into the gap to underwrite the cost of access for the initial period, allowing African institutions to kick in when decreasing cost and increased utility and benefit make it viable for them to assume the full cost. The target figure used in this proposal is a cost of $200 per Mbps-month.

The financial risk is compounded by the ongoing international financial meltdown, where donor foundations are looking more to their survival and commitments are being reduced,

and national governments are focusing resources on supporting internal national systems. This will also inevitably impact on time lines for the rolling out of marine fibre to the East Coast of Africa.

The risk of having implementation frozen by the financial meltdown is minimised by working with multiple development partners – initially a necessary approach due to the nature of the project, but now bringing on board the advantage of removing single points of failure from financial support and projections.

7.4 Policy and Regulation

The policy and regulatory environments within the region have been evolving mostly for the better. There is however continuing risk that member NRENs (on which UbuntuNet rests) and indeed UbuntuNet itself will be disabled in some parts of the region due to policy and regulation that impede research and education networking.

This risk will be mitigated by continuous monitoring of the policy and regulatory environments, and proactively supporting NRENs to engage directly in policy and regulatory dialogues (based on research) that will enable the growth of positive environments.

7.5 Sustainability of NRENs

The strength of UbuntuNet is in the strength of the member NRENs. Many of these are new, and do not even have operational networks. The Alliance will continue with its proactive role of building the organizational and operational capacity of NRENs so that they can give real value to their members and through that grow stronger. Capacity building is therefore a key pillar of the Policy and Master Plan.

8 MONITORING AND EVALUATION

Monitoring and evaluation are key ongoing processes for a major multifaceted undertaking like the Master Plan for Consolidating Research and Education Networking in Africa. Figure 5 is a conceptual illustration of the CORENA Program Logic. A comprehensive monitoring and evaluation framework that should be read in conjunction with the Policy and Master Plan has been developed.

The logic embedded in Figure 5 can be read as: *UbuntuNet, using available resources implements various strategies (Strategic Actions) identified by CORENA as appropriate for effecting required changes. The implementations will naturally result into specific service outputs (Outputs) to different categories of beneficiaries (Boundary partners) with whom CORENA directly interfaces. If the strategies are successful, certain change practices eventually show-up on the boundary partners (Outcome Challenges). The change practices will however, not show-up at one go, but as a gradual build up (Progress Markers), starting with the simple signs (theexpect to see) and then to the more difficult signs (the love to see). Periodically, the program collects information about its boundary partners and the environmental context (ecological context) in which it operates and uses the information to align its strategies accordingly (Organisational Practices). If the change practices that are observed in the boundary partners are sustained for extended*

period of time, there will be considerable contribution of CORENA towards African Education and Research Institutions exploiting their full potential in contributing to national and international human development, and increasing their country's contribution to, and share in intellectual property output (Impact).

The above framework provides foundation for formulating the output, outcome and impact M&E strategies for CORENA that are captured in the document detailing the Monitoring and Evaluation Plan.

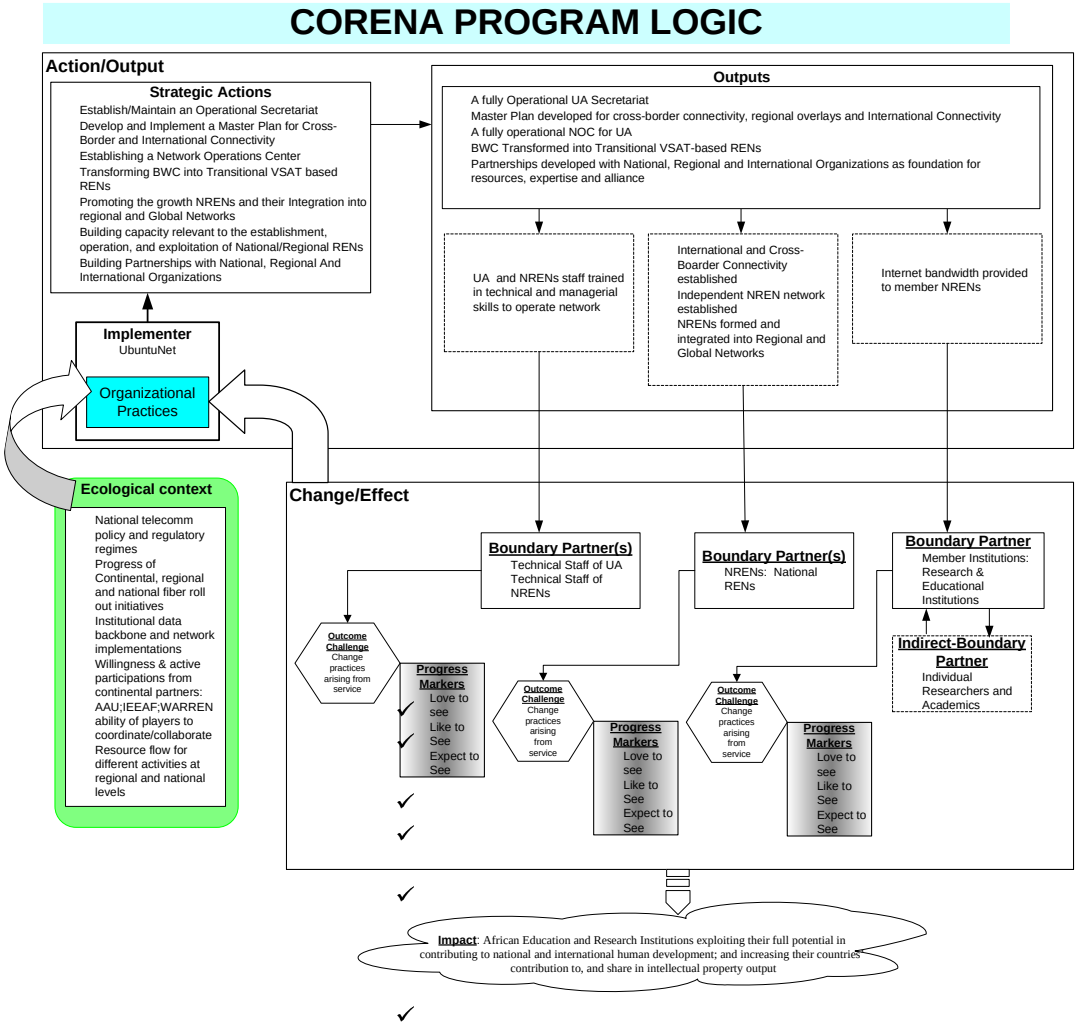

Figure 5: CORENA Program Logic

THE IMPLEMENTATION MASTER PLAN

1. INRODUCTION

The implementation Master Plan is aimed at enabling a combination of logical sequencing with opportunities that will arise during the course of implementation. Each project can be implemented as an isolated whole, but all the projects create a fit that will lead in time to an operational regional research and education network providing gigabit connectivity regionally and internationally.

2. COST AND TIMELINE SUMMARY

Table 1 shows the Master Plan Cost Summary by Strategic Programme Area, showing a total need of USD42,908,735 over a five year period starting January 2009. This is a summary of project and recurrent costs as discussed below and detailed by in Annex 1.

Table 1: Master Plan Cost Summary by Programme Area (USD)

Programme	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
NRENs Development and Capacity Building Programme	288,300	288,300	302,715	302,715	317,851	1,499,881
African NRENs Connectivity Programme	20,073,000	73,000				20,146,000
Institutional Sustainability Programme	820,700	1,035,700	1,174,985	1,194,985	1,236,484	5,462,854
Policy Advocacy Programme	70,000	45,000	45,000	45,000	45,000	250,000
Interconnections Programme	2,970,000	2,895,000	2,895,000	2,895,000	2,895,000	14,550,000
Technology, Hosting and Support Services Programme	300,000	200,000	160,000	160,000	180,000	1,000,000
TOTAL	**24,522,000**	**4,537,000**	**4,577,700**	**4,597,700**	**4,674,335**	**42,908,735**

3. IMPLEMENTATION PLAN AND COSTS FOR EACH PROJECT

The implementation plans for each project as well as the related costs are detailed in this section.

3.1 Project 1: The Virtual REN (VREN)

Activities

i. Identify and engage consultants with experience and contacts in the satellite services sector to provide guidance and enable/lead negotiations with satellite service providers.
ii. Target Taide, serving MAREN and ZAMREN, as the demonstration case.
iii. Support MAREN and ZAMREN to acquire their ASNs prior to implementation

iv. Engage a consultant prior to implementation to carry out site-specific technical detailing and guide the procurement and installation of equipment.

Project 1 Cost estimates

Item	Cost Element	Quantity	Unit Cost	Total cost
1	Consultant (to detail, negotiate, support) (fees)	Item		10,000
2	Consultants' costs	Item		5,000
3	Router at teleport	1	8,000	8,000
4	Bandwidth manager	1	35,000	35,000
5	Legal Costs	Item		5,000
6	Installation	Item		5,000
	Project Management and admin	Item		5,000
	Total, 1 VREN			**73,000**
	2 VRENs (Intelsat and Taide)			***146,000***

3.2 Project 2: The Regional backbone

The regional backbone sub-projects are defined according to groupings that create access paths for landlocked countries to the submarine landing points. Based on this approach, the following sub-projects, each of which can be independently implemented, have been identified:

- Sub Project 1: ZAMREN, MAREN, Eb@le South, TERNET South, Zimbabwe REN, Botswana NREN, MoRENet (Target landings: Dar es Salaam and/or Beira) (6 border crossings)
- Sub Project 2: RwEdNet, Eb@le East, RENU, Burundi REN, KENET, TERNET North (Target landings: Mombasa and/or Dar es Salaam) (5 border crossings)
- Sub Project 3: SUIN, EthERNET, RENU North, KENET North, Djibouti NREN (Target landings: Port Sudan, Mombasa, Djibouti) (4 border crossings)
- Sub Project 4: NAMREN, Botswana, Angola, TENET (Target landings: Mtunzini, Walvis Bay, Luanda) (6 crossings)
- Sub Project 5: Lesotho, Swaziland, TENET, MoRENet (Target landing: Maputo, Mtunzini) (3 crossings)

Design and operations principles:

i. The Alliance will enter into standardised contracts – that govern the provision by the NRENs to UbuntuNet of operational cross-border services at Layer 2 – with the pair of NRENs on either side of the border. UbuntuNet will guide such NRENs (where there is no capacity) on the cost and pricing model for services.
ii. The Alliance will be securing wavelengths rather than dark fiber.
iii. The Alliance will contract long-term expertise to manage and drive the implementation of cross-border connectivity based on prioritisation. The Team responsible will consist the UbuntuNet Technical Manager; a person with sector

regional knowledge (eastern and southern Africa); and a person with industry and regulatory knowledge.

iv. There will be a Layer 3 POP in each country. One policy will be used within the UbuntuNet ASN for Layer 3 configuration.
v. There will be Layer 2 connectivity within and across borders
vi. The minimum capacity on links will be 10Gbps with metro-ethernet hand off;
vii. All elements of the backbone will be visible to the NOCs.
viii. The backbone will not be a monolithic entity: it will be based on evolving standards that will maintain interoperability;

Activities

i. Hold a representative technical forum to fully define backbone functionality and to adopt the appropriate standard.
ii. Engage a consultant who will capture the intent and formalise into a functionality and standards document.
iii. Engage consultants when and as fiber opportunity arises, who will prepare detailed designs for each sub-project. The deliverables will be a proposed route map, functional specifications, project budget, contractual framework, suppliers, definition of NREN roles, requirements for regulatory compliance, time frames, and risks. It should be noted that while six backbone sub-projects have been identified, it unlikely that a single fiber opportunity will fully address any such sub-project

Project 2: Cost estimates

Costs are estimated based on only cross-border IRUs running a maximum distance of 100km across a given border. The assumed cost is USD500,000 for one 10Gbps wavelength or IRU for 20 years. The in-country Layer 2 access will be a recurrent cost paid to NRENs. The set up cost for a Layer 3 router in each member country is an Alliance capital cost.

Design Phase Costs

	Cost Element	**Qty**	**Unit Cost**	**Total cost**
1	Technical forum to define backbone functionality and standards	20	1,500	30,000
2	Consultant to draft standards doc	1		10,000
3	Review and finalisation by a working group of 3+2	5	2,000	10,000
	Sub-total			***50,000***
	Per Sub-Project			
1	Consultant to carry out the detailed design (see deliverables list)			25,000
2	Consultants costs, meetings, etc			15,000
	Total per sub-project			*40,000*
	10 sub-projects during 5 years			***400,000***
	Project Management and other overheads (10%)			***50,000***
	OVERALL TOTAL			***500,000***

Implementation Phase Costs

	Cost Element	Qty	Unit Cost	Total cost
1	Layer 3 Router including interface cards	22	50,000	1,100,000
2	Rack and sundry equipment	22	10,000	220,000
3	Consultancy support (procurement, implementation, final negotiations),	22	10,000	220,000
4	Installation	22	5,000	110,000
5	Sub-project 1 border crossings	6	500,000	3,000,000
6	Sub-project 2 border crossings	5	500,000	2,500,000
7	Sub-project 3 border crossing	4	500,000	2,000,000
8	Sub-project 4 border crossings	6	500,000	3,000,000
9	Sub-project 5 border crossings	3	500,000	1,500,000
10	***Add: Design phase costs***	***Item***		***500,000***
	Total for Border-crossings			***14,150,000***

3.3 Project 3: International Connectivity

Current opportunities for the East Coast of Africa:

i. TENET has purchased 10Gbs of IRUs on SEACOM to Mtunzini. TENET has confirmed that they would avail this capacity to the Alliance at the same cost as TENET member universities, subject to the AUP. This is expected to be available during the last quarter of 2009.
ii. RENU has received a donation of 10Gbps IRUs through the IEEAF, from Kampala torough the SEACOM cable at Mombasa or other inland landing station. According to the stewardship agreement to be signed, this capacity is also open to other NRENs in the region (subject to the AUP) on an equal basis. This will also be available during the last quarter of 2009
iii. EASSy planned landing in Mombasa, Dar es Salaam, Maputo, Mtunzini, Mogadishu, Djibouti. This is expected late 2010.
iv. TEAMS is a potential whose specific landing dates and benefits have to be evaluated.
v. SEACOM, EASSy, and TEAMS are all East Coast opportunities. For the West Coast, there is SAT3, which currently carries UbuntuNet traffic from South Africa to the London router; and other emerging opportunities whose timelines are still very fluid.

The plan, in all cases, is to enter into formal contract for access for member NRENs, enabling gigabit international connectivity. Envisaged contracts (stewardship or commercial) will be with IEEAF; TENET; Government of Kenya; and EASSy. These

contracts will relate to access to international capacity and its management for the benefit of member NRENs.

We recognize the potential of access to the IEEAF capacity as a 10Gbps IRU purchase for 20 years at a cost of USD20 million (the basis being the price paid by TENET for the same capacity for the same period on the same cable). This is captured in the financial projections both as a cost and as a donation.

The key components of the Master Plan for international connectivity are therefore:

- Access to the donated IEEAF capacity for the Eastern Cluster countries;
- Access to the purchased TENET capacity for the South Cluster countries;
- Access, for now, through SAT3 for the countries falling on the West Coast of Africa.

All costs associated with such access will be recurrent. There are therefore no planned capital outlays for international bandwidth in the Master Plan: The capacity available from IEEAF and TENET are projected to meet our needs over the five years of this plan.

We however recognize that emerging opportunities may call for such an outlay, in which it will be approached, for purposes of the plan, on an ad hoc basis.

3.4 Project 4: Network Operations Centre

The first Network Operations Centre will be established in Nairobi, and the second one in Johannesburg (the latter might change to another location within South Africa if so advised by TENET) under the contracted oversight of KENET and TENET respectively. The role of KENET will be relatively thin as Nairobi is also the planned location of the Technical Manager as well as key technical staff.

Key elements in successful implementation and operation are accommodation (space); utilities (24X7 power and connectivity); hard and soft infrastructure; and human resource.

Activities

i. Recruitment of the Technical Manager. It is essential to have the Technical Manager on board so that they can participate in design and implementation, and also support the identification of the key technical team.
ii. Build partnerships with AfNOG, NSRC, IEEAF, Dante, and others, to train the staff on an on-going basis through attachments, secondments and specialised training.
iii. Define service levels (with clients and with suppliers)
iv. Prepare outsourcing RFPs for Layer 2 management and call centres
v. Issue RFPs, followed by analysis and award of contracts
vi. Engage a consultant to specify the NOC requirements.
vii. Procure and install NOC equipment and related facilities.

Project 4 Cost Estimate (per NOC)

	Cost Element	Qty	Unit Cost	Total cost
1	Consultant to detail and specify	Item		5, 000
2	Consultants costs	Item		3, 000
3	Servers	2	5,000	10,000
4	Monitoring hardware (PCs, Laptops, printer; power backup)	4	4,000	16,000
5	Monitoring software	Item		12,000
6	Furniture (sets)	4	500	2,000
	Total			***48,000***
7	*Rack space*		*Recurrent*	
8	*Clean 24x7 power (Recurrent) ditto*		*Recurrent*	
9	*Space rental*		*Recurrent*	
10	*Call centre facility ditto*		*Recurrent*	

3.5 Project 5: Africa-Indian Ocean wave (AI-Wave)

This project has been defined only in concept at the time of approval of this Master Plan. It is not expected to have any cost implications beyond what has already been provided for in the regional backbone: if the interconnection points are enabled at the cable landing stations through the AI-wave, the cost of implementation would be lower than implementing a Layer 3 POP in each member country.

ANNEX 1: COST SUMMARY AND CASH FLOW PROJECTIONS, 2009 - 2013

	PROJECT/COST ITEM	2009	2010	2011	2012	2013	TOTAL
A	**CAPITAL COSTS**						
1	The Virtual REN (VREN) infrastructure	73,000	73,000				146,000
2	The Regional backbone						-
2.1	*Design Phase*	140,000	90,000	90,000	90,000	90,000	500,000
2.2	*Implementation (Cross-border IRUs and AI-Wave)*	2,850,000	2,850,000	2,850,000	2,850,000	2,850,000	14,250,000
3	International Bandwidth						
	10 Gbps IRUs to Europe and Asia	20,000,000					20,000,000
4	Network Operations Centre	50,000					50,000
5	Computer Equipment for staff (10 sets incl lap-tops)	20,000	20,000		20,000	20,000	80,000
	TOTAL PER YEAR AND OVERALL	**23,133,000**	**3,033,000**	**2,940,000**	**2,940,000**	**2,940,000**	**34,986,000**
B	**RECURRENT COSTS (SECRETARIAT)**						
1	Staff salaries	322,500	532,500	685,125	685,125	719,381	2,944,631
2	Other secretariat costs, including travel	104,000	104,000	109,200	109,200	114,660	541,060
3	Cost of out-sourced operations	180,000	180,000	180,000	180,000	180,000	900,000
4	Capacity building and Dissemination	288,300	288,300	302,715	302,715	317,851	1,499,881
	(Includes UbuntuNet Connect)						
5	Depreciation	35,000	40,000	40,000	40,000	40,000	195,000
6	Occasional Consultants and Professionals	30,000	30,000	25,000	25,000	20,000	130,000
7	Governance Meetings (Board and COM)	129,200	129,200	135,660	135,660	142,443	672,163
	TOTAL PER YEAR AND OVERALL	**1,089,000**	**1,304,000**	**1,477,700**	**1,477,700**	**1,534,335**	**6,882,735**
C	**CONTENT NETWORKS AND M&E**						
1	Development and support of content networks						
1.1	*Grid Computing*	100,000	50,000	30,000	30,000	30,000	240,000
1.2	*Other special interest groups (Librarians, etc)*	100,000	100,000	100,000	100,000	100,000	500,000
2	Monitoring and evaluation (Inc. Theory of Change)	100,000	50,000	30,000	30,000	50,000	260,000
	TOTAL PER YEAR AND OVERALL	**300,000**	**200,000**	**160,000**	**160,000**	**180,000**	**1,000,000**
D	**INCOME**						
	Annual membership fees	15,000	22,500	30,000	30,000	30,000	127,500
	Agency fees from member NRENs (at 70% recovery)	210,000	840,000	980,000	1,260,000	1,400,000	4,690,000
	TOTAL INCOME	**225,000**	**862,500**	**1,010,000**	**1,290,000**	**1,430,000**	**4,817,500**

	RECURRENT DEFICIT (D - B - C)	**(1,164,000)**	**(641,500)**	**(627,700)**	**(347,700)**	**(284,335)**	**(3,065,235)**
E	**FUNDING REQUIRED**						
	Capital expenditure	23,133,000	3,033,000	2,940,000	2,940,000	2,940,000	34,986,000
	Content Networks and M&E	300,000	200,000	160,000	160,000	180,000	1,000,000
	Recurrent Deficit	1,164,000	641,500	627,700	347,700	284,335	3,065,235
	TOTAL FUNDING NEEDED	**24,597,000**	**3,874,500**	**3,727,700**	**3,447,700**	**3,404,335**	**39,051,235**
F	**SUMMARY**						
		2009	**2010**	**2011**	**2012**	**2013**	**TOTAL**
1	CAPITAL OUTLAYS	23,133,000	3,033,000	2,940,000	2,940,000	2,940,000	34,986,000
2	RECURRENT COSTS	1,089,000	1,304,000	1,477,700	1,477,700	1,534,335	6,882,735
3	INCOME	225,000	862,500	1,010,000	1,290,000	1,430,000	4,817,500
4	RECURRENT DEFICIT: (3) - (1)	(1,164,000)	(641,500)	(627,700)	(347,700)	(284,335)	(3,065,235)
	FUNDING SUPPORT: (1) + (4)	24,597,000	3,874,500	3,727,700	3,447,700	3,404,335	39,051,235
G	**MASTER PLAN CASH FLOW BY STRATEGIC PLAN PROGRAMMES**						
	Programme	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**TOTAL**
	NRENs Development and Capacity Building Programme	288,300	288,300	302,715	302,715	317,851	1,499,881
	African NRENs Connectivity Programme	20,073,000	73,000				20,146,000
	Institutional Sustainability Programme	820,700	1,035,700	1,174,985	1,194,985	1,236,484	5,462,854
	Policy Advocacy Programme	70,000	45,000	45,000	45,000	45,000	250,000
	Interconnections Programme	2,970,000	2,895,000	2,895,000	2,895,000	2,895,000	14,550,000
	Technology, Hosting and Support Services Programme	300,000	200,000	160,000	160,000	180,000	1,000,000
	TOTAL	**24,522,000**	**4,537,000**	**4,577,700**	**4,597,700**	**4,674,335**	**42,908,735**
	LESS: Projected Income (membership and agency fees)	***225,000***	***862,500***	***1,010,000***	***1,290,000***	***1,430,000***	***4,817,500***
	FUNDING SUPPORT REQUIRED	**24,297,000**	**3,674,500**	**3,567,700**	**3,307,700**	**3,244,335**	**38,091,235**