AfricaConnect Extension Project

Project Financed by European Union

Lishan Adam
Astec Global ICT Consortium Implemented by Linpico
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NREN in Africa

- 55 Countries
- 1.02 billion people
- 12 million NREN users
- Estimated 4.5 (1.5 ESA + 3.0 NA) million connected
- How much it costs to connect 7.5 million NREN user?
• Launched in November 2012
• Total budget of €14.75m, with 80% (€ 11.8 m) of the funding provided by the EDF building on a roadmap by FEAST
• Lasts for four years to 2015..
  – the first of which was devoted to plan and procure the network
  – an operational phase
<table>
<thead>
<tr>
<th>Country</th>
<th>Students</th>
<th>Faculty</th>
<th>Researchers and others</th>
<th>Total NREN population</th>
<th>% of tertiary Student</th>
<th>Population in million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya</td>
<td>259,080</td>
<td>9600</td>
<td>960</td>
<td>269,640</td>
<td>0.6</td>
<td>43.18</td>
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<tr>
<td>Malawi</td>
<td>47,730</td>
<td>2130</td>
<td>213</td>
<td>50,073</td>
<td>0.3</td>
<td>15.91</td>
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<tr>
<td>Mozambique</td>
<td>128,520</td>
<td>4500</td>
<td>450</td>
<td>133,470</td>
<td>0.51</td>
<td>25.2</td>
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<tr>
<td>Rwanda</td>
<td>81,366</td>
<td>2790</td>
<td>279</td>
<td>84,435</td>
<td>0.71</td>
<td>11.46</td>
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<td>South Africa</td>
<td>819,040</td>
<td>48,000</td>
<td>4800</td>
<td>871,840</td>
<td>1.6</td>
<td>51.19</td>
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<tr>
<td>Sudan (not covered)</td>
<td>148,800</td>
<td>5600</td>
<td>560</td>
<td>154,960</td>
<td>0.4</td>
<td>37.2</td>
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<tr>
<td>Tanzania</td>
<td>176,786</td>
<td>5800</td>
<td>580</td>
<td>183,166</td>
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<td>47.78</td>
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<tr>
<td>Uganda</td>
<td>327,150</td>
<td>12100</td>
<td>1210</td>
<td>340,460</td>
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<tr>
<td>Zambia</td>
<td>98,560</td>
<td>3500</td>
<td>350</td>
<td>102,410</td>
<td>0.7</td>
<td>14.08</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>2,087,032</strong></td>
<td><strong>94,020</strong></td>
<td><strong>9,402</strong></td>
<td><strong>2,190,454</strong></td>
<td><strong>282.35</strong></td>
<td><strong>282.35</strong></td>
</tr>
</tbody>
</table>
AfricaConnect Extension Project

Objective

• Carry out feasibility study for extending the AfricaConnect project to West and Central Africa and beyond

• Goal: build the backbone and capacities of existing NRENs to enable them to link to each other and to their peers in other continents via GEANT.

• Covers 7.5 million users
Five Phases

Inception
- Meet with EU
- Refine methodology

Desk Review
- Readiness analysis
- Infrastructure, regulatory, application and capacity review
- Survey operators

Field Research
- Field research
- WACREN Retreat
- Scenario development

Synthesis
Roadmap, implementation plan
- Workshop
- Draft report

Dissemination
- Reporting
- Dissemination

Mar/Apr
May/Jun
Jul/Aug
Oct/Nov
Dec/Jan
<table>
<thead>
<tr>
<th>Dimensions</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment</td>
<td>Government understanding of benefits, financial commitment, policy and regulatory endorsement</td>
</tr>
<tr>
<td>Coordination</td>
<td>Membership, sustainable governance, and management framework - institutions, champions, strategies</td>
</tr>
<tr>
<td></td>
<td>Relevant national strategies in support of RENs</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Commercial condition, regulatory endorsement and options for NREN backbone</td>
</tr>
<tr>
<td></td>
<td>Steady equipment supply</td>
</tr>
<tr>
<td>Capability</td>
<td>Human resources and skills availability, certification and standards, training in internetworking and business development</td>
</tr>
<tr>
<td>Content and services</td>
<td>Sharable national resources, collaboration in OER, libraries, apps, national innovation systems</td>
</tr>
<tr>
<td>Cash (financial resources)</td>
<td>Public funds, donor fund, universal access funds for NREN backbone</td>
</tr>
</tbody>
</table>
NREN CMM

Level 4 (20-25)
- Advanced service offering
- NREN provides connectivity to advanced services such as grid/cloud computing
- A rich culture of International collaboration is established through communities

Level 3 (15-20)
- Regional and international connectivity and coherent operation of NREN achieved
- Access to REN Resources and participation in research and education communities attained

Level 2 (10-15)
- NREN established, formal commitment from universities secured
- Formalized organizational structure is established
- Cost of connectivity brought down

Level 1 (5-10)
- Early NREN formation, structured discussion about NREN
- Leading institution assigned, meeting on NREN held

Level 0 (0-5)
- No NREN,
- Commodity Internet
- Scarce Bandwidth

Source: Greeves
1. Commitments - endorsement and resources matter
2. Champions and institutions nurture the relationship
2. Interaction and Consensus ...

- Champions (director of corporate IT services from the largest university in a country),
- CTOs of the other universities that are expected to work closely with the champion,
- Leaders of tertiary education institutions (college deans, university presidents/vice chancellors, etc.),
- National university councils that accredit tertiary level institutions,
- Ministries responsible for higher education (e.g. Ministry of Education, Ministry of Science and Technology),
- Ministries responsible for communication (e.g. Ministry of Transport and Communication, Ministry of Communication and Information Technology)
- Communications sector regulator,
- Government IT agency,
- Ministry responsible for finance and economy (e.g. Ministry of Finance)
- Lead researchers or practitioners that are often regarded as national icons (e.g. lead surgeon, lead educator, etc.)
International Bandwidth

Current = 18 Tbps
Future = 120 Tbps

Current = 7 Tbps
Future = 25 Tbps

1 - 2 Tbps (less than 10% use)
Regional and International Infrastructure

Source: World Bank

Source: PIDA
Carrier of carriers

Few carrier of carriers
No competition

Source: PIDA

Fientis expected
## Regulatory and Policy Endorsement

| Broadband               | Fiber network (Eritrea and Guinea Bissau), exception  
|                        | Cape Verde, Mauritius, Senegal and South Africa well developed fiber  
|                        | 400,00 Km fiber |
| Pricing                | High prices in landlocked countries - Benin $2000 Mbps/month to  
|                        | Senegal $80 Mbps/month |
| Licensing              | Legal instruments designed before the advent of NREN |
|                        | No clear guide on CUG |
| Ownership              | Network ownership is generally not allowed |
| Universal access       | Financing through universal access is not always straightforward -  
|                        | some initiative (e.g. Nigeria) |
Criteria for selection

- Infrastructure ability to access fiber infrastructure
- NREN activity
- Probability of meeting Obligation
- 20% contribution Registration, sign agreements
- Readiness score
Readiness results

Phase I (Leaders)
- West Africa - Benin, Cote d’Ivoire, Ghana, Nigeria, Senegal and Togo
- Central Africa - Cameroon, Gabon
- Eastern Africa - Burundi, Ethiopia, Madagascar
- Southern Africa - Botswana, Lesotho, Namibia

Phase II (Followers)
- West Africa - Burkina Faso, Cape Verde, Gambia, Guinea, Guinea- Bissau, Liberia, Mali, Niger, Sierra Leone
- Central Africa - Chad, Central African Republic, Republic of Congo, Sao Tome and Principe and Equatorial Guinea
- Eastern Africa - Djibouti, Eritrea, Somalia and South Sudan
- Southern Africa - Angola, Comoros, Mauritius, Seychelles, Swaziland, Zimbabwe
## NREN population

<table>
<thead>
<tr>
<th>Country</th>
<th>Students</th>
<th>Faculty</th>
<th>Researchers and others</th>
<th>Total</th>
<th>% of Student</th>
<th>Population</th>
</tr>
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<tbody>
<tr>
<td>Benin</td>
<td>100,000</td>
<td>4170</td>
<td>417</td>
<td>104,587</td>
<td>0.995</td>
<td>10.05</td>
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<td>Botswana</td>
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<td>900</td>
<td>90</td>
<td>25,990</td>
<td>1.1</td>
<td>2.04</td>
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<tr>
<td>Burundi</td>
<td>35,000</td>
<td>1800</td>
<td>180</td>
<td>36,980</td>
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<td>Cameroon</td>
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<td>4500</td>
<td>450</td>
<td>280,540</td>
<td>1.27</td>
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<td>600</td>
<td>167,502</td>
<td>0.811</td>
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<td>19,600</td>
<td>1960</td>
<td>727,881</td>
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<td>15,577</td>
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<td>65</td>
<td>13,015</td>
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<td>6000</td>
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<td>200</td>
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<td>4,235,329</td>
<td>397.982</td>
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<tr>
<td>Country</td>
<td>Legally established NREN</td>
<td>Connection between institutions</td>
<td>Resources flow</td>
<td></td>
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<tr>
<td>--------------</td>
<td>--------------------------</td>
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<tr>
<td>Benin</td>
<td>RerBenin</td>
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<td>Yes</td>
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<td>No</td>
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<td></td>
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<tr>
<td>Burundi</td>
<td>No</td>
<td>No</td>
<td>Expected</td>
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<td></td>
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<tr>
<td>Cameroon</td>
<td>RIC</td>
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<td>Yes</td>
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<td>Cote d’Ivoire</td>
<td>RITER</td>
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<td></td>
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<tr>
<td>Ethiopia</td>
<td>EtheRNet</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabon</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td>GHARNET</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td>No</td>
<td>No</td>
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<tr>
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<td>Yes</td>
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<tr>
<td>Nigeria</td>
<td>ngREN</td>
<td>Yes</td>
<td>Yes</td>
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<td>Senegal</td>
<td>SenRER</td>
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<td>Yes</td>
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<tr>
<td>Togo</td>
<td>RENRT</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>
Desired applications

• Internet

• Content Services - repository, Open educational resources including national Learning Management Systems

• High speed networks and computing power, grids, labs and scientific equipment in support of research in health, climate change, environment, agriculture, natural products
Connectivity and Cost

• RFI soliciting information on cost and possibility was sent
• Follow up in Ghana, Nigeria, Senegal
  – Poor RFI result, but two major companies provided data
• Equipment providers were also engaged
  – Good response based on the experience in eastern and southern Africa
  – Logistics (tax, understanding the implication)
• Flexibility in procurement process for negotiation with service providers
• An exception to rules of origin for the equipment
Possible connection
Choice of countries and current links

Discussion with Orange/Sonatel for STM1 link to Paris /RENATER
Multi-country connection – Gambia, Guinea Guinea Bissau, Mali, Cote d’Ivoire, Burkina Faso Mauritania
WACREN NOC
Training and development hub

High concentration of fibre in ng
Discussion to link U-hub to Lagos
ngREN to establish link to London
Not much difference between Accra/London, Lagos/London
Political, linguistic consideration

Source: World Banj
RISKs and Issues

• Unpredictable NREN development - takes long for countries to participate... some countries might move fast, other
• Inability of NRENs to raise resources...
• Limited progress with competition for cross-border networks – landlocked countries will continue to suffer
• How, when, to connect the rest of landlocked countries
• Lack of governance and institutional framework
• Strong WACREN...
  – Initial funding
  – Business model based on the UA approach towards sustainability
Implementation Issues

• Engaging identified NRENs
  – WACREN should raise awareness on requirements to pay
  – Raise resources elsewhere
  – UA to press on countries on the remaining countries
  – Policy makers should know the importance of payment for NREN development?

• Engage with connectivity providers
  – More data for cross-border connection opportunities and costs (IRU or rentals of managed services –
  – Engage with equipment suppliers for delivery, donation, warehousing, SLAs

• WACREN NOC functions, NEG functions, Fault handling, operational and business models
  – WACREN needs to develop NOC functional guidelines, NEG functional guidelines based on UA experience
  – NREN need guidance from AUP to how to handle and report faults
  – NEG support for WACREN

• Capacity building
  – Basic, intermediate and advanced training
  – Peering with other NRENs
  – ToT and different level of training
Thank you