



***FEAST***

Feasibility Study for the

***AfricaConnect Initiative***

***ERINA4Africa***

e-Infrastructure and application mapping

***Computing & Communication***

***Systems Design***

Capacity building Initiative

# e-Infrastructures

e-infrastructures are environments supporting distributed research collaboration, including supporting resources, such as:

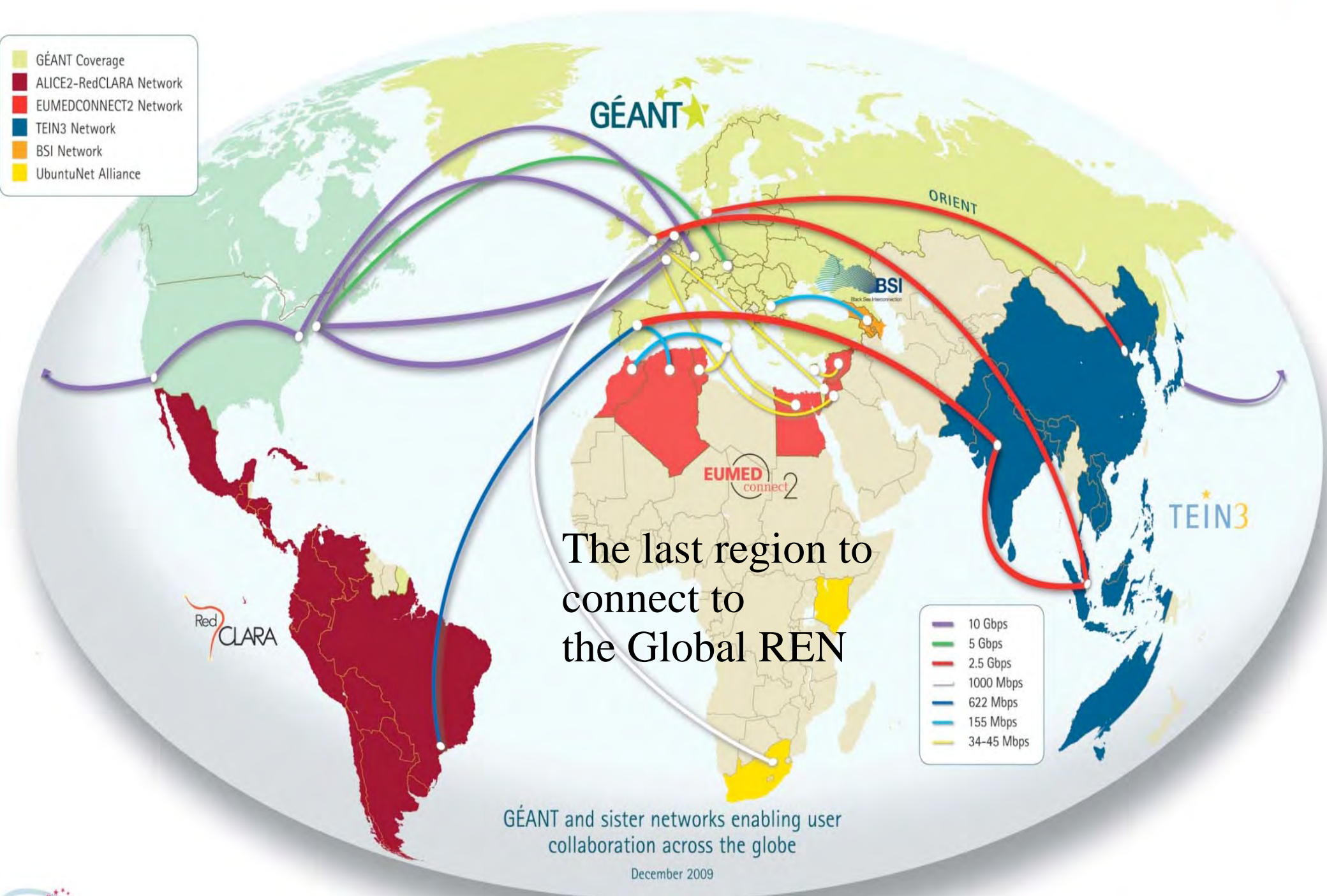
- Computing resources
- Communication networks
- Data repositories

# Axioms

1. Research and higher education institutions are key actors in the creation of the knowledge society
2. They need a common dedicated network infrastructure, just like banks, airline industry, weather institutions, etc.
3. Not connected institutions cannot fulfill their missions
4. Sub-Saharan African universities are currently not connected but need to be, just as their peers on other continents
5. The connection is done via National Research and Education networks (NRENs) and Regional (RRENs) built on top of leased links in terms of dark fibre, wavelengths or data capacity.



- GÉANT Coverage
- ALICE2-RedCLARA Network
- EUMEDCONNECT2 Network
- TEIN3 Network
- BSI Network
- UbuntuNet Alliance



The last region to connect to the Global REN

GÉANT and sister networks enabling user collaboration across the globe  
December 2009

# FEAST Findings

- There is enough infrastructure and ready research and education communities to start the first phase of AfricaConnect.
- Main challenges include raising the political awareness about
  - The nature and importance of dedicated research and education networks
  - The necessity and will to accelerate the transformation of the communication market making communication infrastructure an affordable utility.

# Recommendations

- Immediate support to
  - The ready NREN communities to acquire links to build and connect to a RREN
  - Strengthen the capacity in terms of educated and trained human resources both in the ready communities and in the emerging communities
  - High-light applications demonstrating the return on investment and motivating a second phase supporting the emerging communities.



# The East Africa Marine System (TEAMS)

## Capacity

- ✓ 2 fibre pairs
- ✓ 120Gbps initial capacity
- ✓ Equipped for 1.2Tbps

## The Cable Route

- ✓ Mombasa -to – Fujairah



**SEACOM is a privately funded African company, offering a 1.28Tb/s submarine fiber optic cable system linking Africa to Europe and Asia via the Middle East**

*“SEACOM is open for business and ready to supply complete solutions for Africa’s Broadband on Demand needs”*

## SEACOM’s drivers

- Wholesale provider of bandwidth
- Deliver infrastructure support for the growth of the ICT sector, e.g. BPO, call centers, education
- Be committed to the principles of open and equitable access to broadband
- Facilitate the development of high volume, low cost market encouraging new industries to emerge, stimulating further demand
- Compliment GSM and fixed line national carriers by providing low cost high capacity bandwidth and additional redundancy
- Be fully funded & majority African owned (76.25%)

## Fibre topography





# The EASSy Fact file...

**EASSy** is a 10,800km submarine fibre optic cable system

- 2 Fibre pairs of 1.4Tbps capacity
- Initially 8 Landing Stations:
  - South Africa
  - Madagascar
  - Mozambique
  - Comoros
  - Tanzania
  - Kenya
  - Djibouti
  - Sudan
- Construction cost \$265 million
- Operational mid – 2010
- **WIOCC** owns 30% of **EASSy**



**WIOCC**

... Africa connected the **EASSy** way



# ... and Berbera

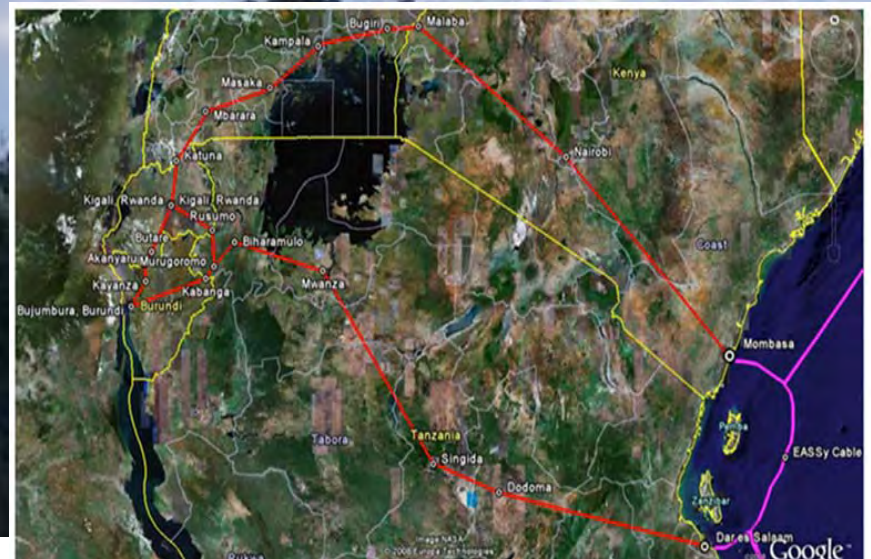
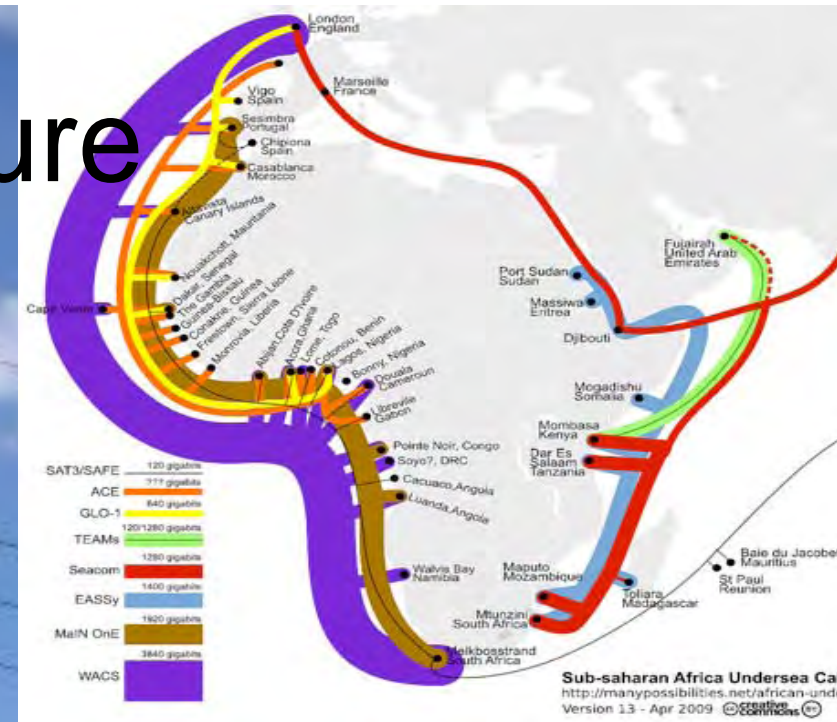
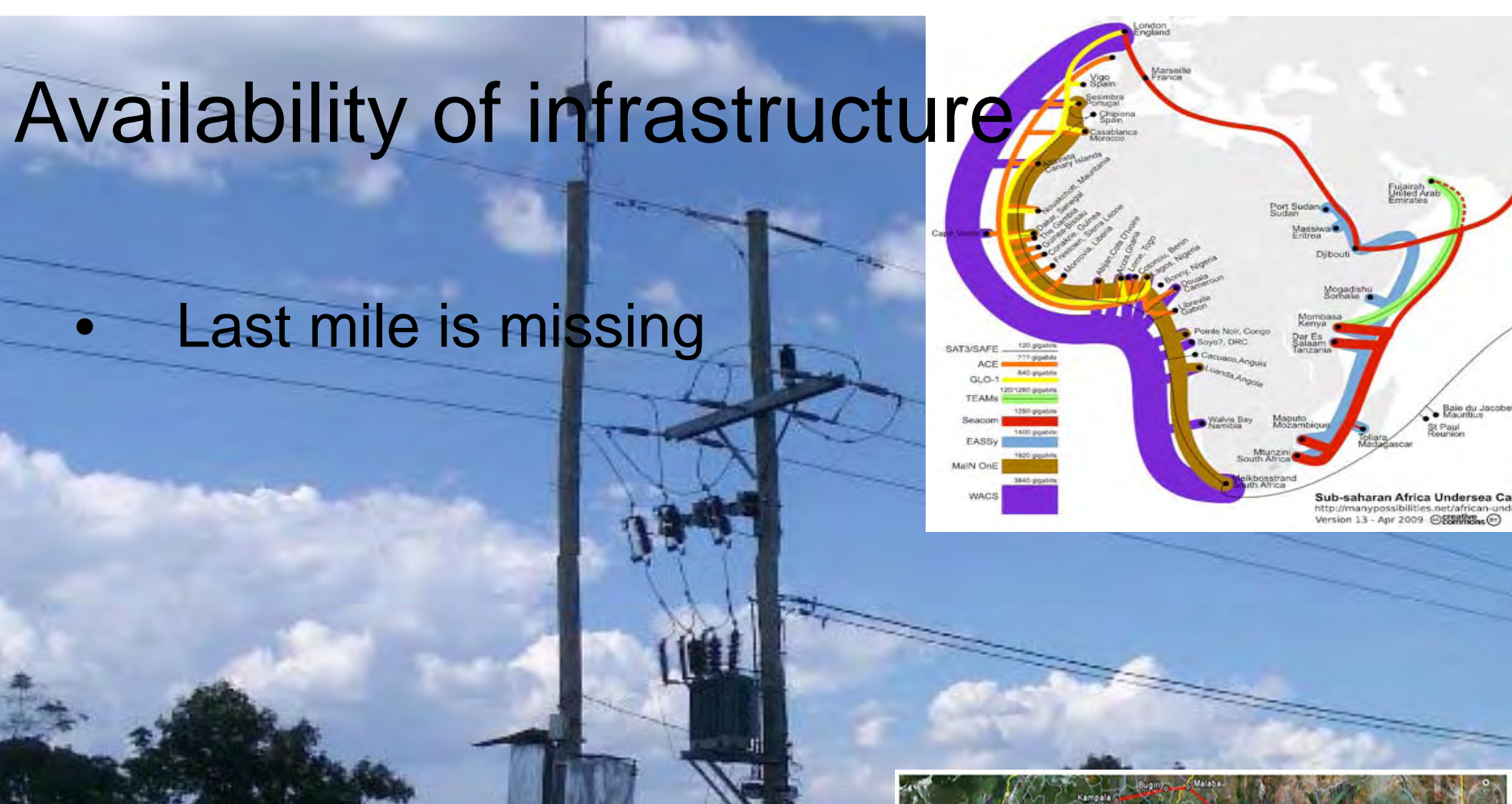


— and



# Availability of infrastructure

- Last mile is missing



# NREN Readiness

- Member institution awareness
  - Campus networks, Lighthouse demonstrators
- NREN
  - Organisation and human resources
  - Acceptable Use and Connection policies,
  - Interconnected campus networks of member institutions
  - Assigned numbers from Afrinic
- RREN
  - Ubutunet Alliance (2005-2006)
  - WACREN (2010-2010/2011)



# Policy and regulatory environment

## Low awareness and will

- Ministries of Higher education research and communication
  - Political awareness of NRENs as the means to connect institutions to their global peers
  - Endorsement and support of NREN organisations
  - Stimulate general telecom transition from low-volume/high price to high-volume/low price
- Regulator
  - Licenses and permits if needed
  - Enforcement of regulations
  - Use the non-commercial NRENs as spearheads

# Commercial conditions

- Policy should give priority to users rather than to vested interests in industry
- Competition must go from “hardly allowed” to “stimulated”
- Open access to key infrastructure resources should be adopted to allow anyone to buy/lease resources on one level and provide services on any higher level
- Right of Way obstacles should be facilitated to solve
- Formal regulations is one thing – strict enforcement and leadership to change behaviour is another.

# Lighthouse demonstrators

## Erina4Africa e-Infrastructure mapping

- Follow up on FEAST findings
- Survey of existing and potential e-Infrastructures in Africa
- Including Cost-Benefit analyses
- Lighthouse demonstrators motivating further investments
- Extension of Erina ([www.erina-study.eu](http://www.erina-study.eu))
- You are invited to contribute

# Just a few examples

- Access to scientific journals
- Connecting partners in the Wellcome Trust Malaria Genome project in Blantyre and Liverpool
- Interconnection of High Performance Liquid Chromatography Laboratories in Dar es Salaam, Kampala and Stockholm
- Teleconsulting and e-learning between hospitals in Maputo, Kigali, Barcelona, Stockholm
- Natural Products Research Network for Eastern and Central Africa [www.napreca.net](http://www.napreca.net)
- Digitization of Agricultural research data in RUFORUM
- Connection of Supercomputers in Addis Ababa, Dar es Salaam and Kigali to the global grid



# Capacity building for sustainability and growth – C&C Systems Design Initiative

- Vocational Training - NREN Twinning
- Capacity building to meet the expected “Tsunami” demand for C&C competence
  - Reinforcement of academic curricula on Master level in C&C systems, networks and services
  - Institutional partnerships/twinning
  - Problem-oriented, project-driven learning
  - Individual learning by doing towards degrees
  - Organisational learning towards certification
  - Learning about communication markets



UbuntuNet  
Alliance

WACREN



European Commission  
Information Society and Media



ROYAL INSTITUTE  
OF TECHNOLOGY



DANTE

[www.feast-project.org](http://www.feast-project.org)

[www.erina4africa.eu](http://www.erina4africa.eu)

[www.aau.org/renu](http://www.aau.org/renu)

[www.ubuntunet.net](http://www.ubuntunet.net)

[www.wacren.org](http://www.wacren.org)

<http://ei-africa.eu/>

Feasibility Study for the

# AfricaConnect Initiative



## Findings and recommendations

A feasibility study supported by the European Commission on the interconnection of African research and education networks to each other and to global research and education resources via GÉANT.

FEAST







FEAST was a one-year feasibility study supported by the European Commission to prepare a roadmap for the AfricaConnect Initiative, one of the nineteen projects of the EU-Africa Partnership for Science, Information Society & Space. FEAST explored the options of deploying sustainable and extensible regional backbone networks in Africa, exclusively dedicated to research and education, to connect National Research and Education Networks (NRENs) to each other, and to global research and education resources via the GÉANT backbone network.



## Findings and recommendations

The findings are that there is enough infrastructure and ready research and education communities to start the first phase of AfricaConnect. The main challenges include political awareness about the nature and importance of dedicated research and education networks as well as the necessity and will to accelerate the transformation of the communication market making communication infrastructure an affordable utility.

The recommendations are to immediately support the ready communities to acquire links to build their networks, to strengthen the capacity in terms of educated and trained human resources both in the ready communities and in the emerging communities, and to high-light applications demonstrating the return on investment and motivating a second phase supporting the emerging communities.

### Availability of infrastructure

Development in Africa is increasingly dynamic, not least due to several new infrastructure initiatives materializing, including the communication infrastructure. **Africa is about to become the best interconnected continent in the world via several submarine cable projects starting operations 2009-2011.**

Although it will still take time to get a dense terrestrial fibre grid providing back-hauls, all major hubs seem now to be connected and most African countries can accelerate their development towards knowledge societies as its foundation, **an open access information and communication infrastructure, becomes available for all to benefit from in their businesses and as citizens.**

### Challenges in policy and regulation

Going from a satellite based infrastructure to a terrestrial one includes many challenges. Policy and regulation need to open up and recognise the information and communication infrastructure as a utility; the market needs to transform from low volume – high price to high volume – low price business models, to the benefit for all stakeholders. **This transformation needs support from policy makers and regulators.**

**The development of the knowledge society is driven by research and education and access to ICT is a must for the responsible institutions.** The research and higher education institutions of Africa need to be connected not only to Internet but more importantly to the dedicated global research and education infrastructure, just as their peers on other continents.

Research and higher education institutions have dedicated networks for performance reasons, just like banks have dedicated networks for security reasons, healthcare institutions for privacy reasons, etc. **Policy makers and regulators need to facilitate access to links for such networks. The fact that the networks are non-commercial and for public good make them useful to support the general market transformation.**

### Regional Clusters

Many African research and higher education institutions are more than aware of the need for getting connected to these global resources and **are preparing to take advantage of the new African infrastructure as it develops**, cooperating in regional clusters.

The **UbuntuNet Alliance** started preparations for a regional cooperation already in 2005 by five pioneering National Research and Education Networks in Southern and Eastern Africa, including KENET in Kenya, MAREN in Malawi, MoRENet in Mozambique, Rwednet in Rwanda and TENET in South Africa, supporting their neighbours to catch up. The UbuntuNet Alliance has now grown to 12 members from Sudan, Ethiopia and Somalia in the north to Mozambique and South Africa in the south ([www.ubuntunet.net](http://www.ubuntunet.net)).

A similar regional cooperation, **WACREN**, is emerging in West and Central Africa. Association of African Universities (AAU) has chartered a Task Force and WACREN is expected to be launched in 2010 ([www.wacren.org](http://www.wacren.org)).

### Capacity building

Institutions in other parts of the world are welcoming and supporting their African peers, e.g. cooperation on capacity building. **Both academic and vocational courses are needed to provide a sustained stream of skilled and qualified people** to develop and maintain their own advanced communications infrastructures to support research and education. The approach is to extend existing academic curricula with laboratory exercises and problem-oriented, project-driven courses on communication networks, as much as possible involving industry.

### The goal is cooperation on Research and Education

**e-infrastructures**, consisting of a combination of ICT-based resources, such as computers, networks, and scientific data repositories facilitating global resource sharing and collaborative research, are key enablers for virtual global research communities and drivers of socio-economic development.

There are mutual benefits in such research cooperation as illustrated by these examples:

\* Scientists at the **Malawi-Liverpool Trust Genome Project** at the University of Malawi College of Medicine and in Liverpool, UK would benefit immediately and substantially from advanced networks to exchange data about DNA samples from people with malaria, making the research more cost-effective and strengthen both research environments.

\* Peering with international colleagues in exposing counterfeit drugs will be of mutual benefit for the worldwide community and researchers at the **High Performance Liquid Chromatograph (HPLC) laboratories** at Makerere University, Kampala and at MUHAS, Dar es Salaam set up in cooperation with Karolinska Institute, Sweden.

**Lighthouse demonstrators** like those described here are an important part of the first phase of AfricaConnect to demonstrate the return on investment and to motivate a second phase connecting more communities as they mature.

More such demonstrators are being identified in the **Erina4Africa** project, focusing on e-Infrastructures for research collaboration in education, healthcare and governance to boost research and innovation in Africa ([www.erina4africa.eu](http://www.erina4africa.eu)).

**Dissemination** of information and discussions about the benefits of e-infrastructures is the focus of the ei-Africa project (<http://ei-africa.eu>).







## Feasibility Study for the AfricaConnect Initiative

### ENGAGING EUROPEAN PEERS

FEAST launched a twinning process in which several European academic institutions and NRENs have committed to support the implementation of the AfricaConnect initiative in terms of twinning with African partners, specifically in education and training. TERENA is the point of contact for NRENs interested in joining this process while KTH is the point of contact for academic institutions.

### ENGAGING PHILANTHROPIC ORGANISATIONS AND DONATING AGENCIES

One of the most important priorities of the FEAST partners and its supporters has been to gain the close collaboration of relevant philanthropic organisations, NGOs and other donating agencies in order to assist the participating NRENs with paying their contributions to the costs of deploying and sustaining the regional infrastructures set up in the AfricaConnect Initiative.

### ASSOCIATED PROJECTS

Projects such as eiAfrica and Erina4Africa are expected to contribute to the identification and dissemination of awareness of existing and new potential applications and collaborative projects.

### FEAST PARTNERS

The FEAST study was carried out by a partnership of DANTE, TERENA and the Swedish Royal Institute of Technology, KTH as the main contractor. ICTP, several European NRENs, AAU and the Ubuntu-Net Alliance supported the project

### FURTHER INFORMATION

The findings are synthesised into a final report, including conclusions and recommendations. More information about the project, including detailed papers describing the project, findings and the road-map itself are on the website, along with information about the FEAST partners.



WACREN



European Commission  
Information Society and Media



[www.feast-project.org](http://www.feast-project.org)

[www.erina4africa.eu](http://www.erina4africa.eu)  
[www.aau.org/redu](http://www.aau.org/redu)  
[www.ubuntunet.net](http://www.ubuntunet.net)  
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