

# KENET Certification Authority

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# About Kenya



# True size of Africa



# Agenda

- About Kenya and Africa
- KENET Governance, Organization and Services
  - Founder member of UbuntuNet Alliance
- KENET and the E4Africa.eu Project
  - CA and iDP and Research Services
  - CoMoDo certificates uptake
- KENET CA Overview and Setup
  - Policy and technical details
  - CA administration and KENET technical capacity
- KENET CA Importance to REN community
  - Doctoral students in engineering, CS, Physics
  - Library repositories and databases



# About Kenya - Country of Marathon Winners?



# Kenya ICT in Higher Education and ICT Context

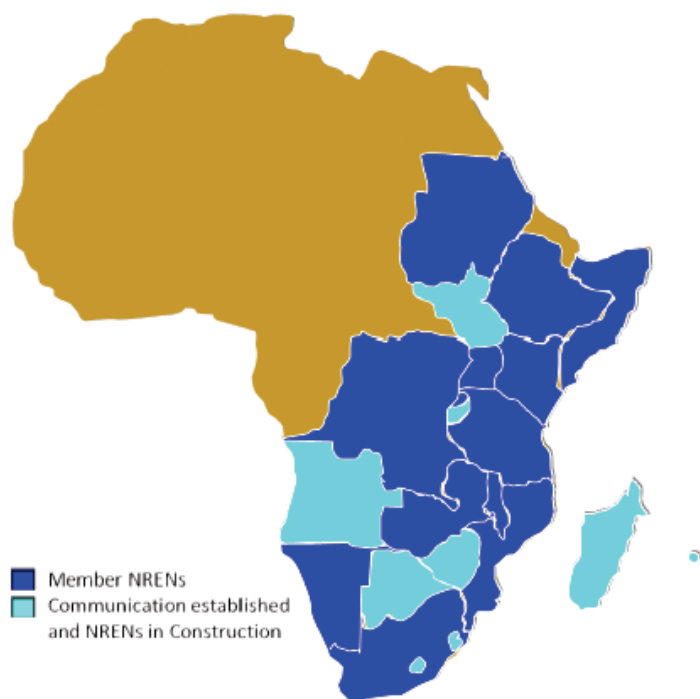
No	Parameter	Dimension
1	Size of Kenya (in Sq. KM)	582,646
2	Population (Millions)	43.18
3	Mobile Subscriptions (Millions)	31.3
4	Mobile Money Transfer Subscriptions (Millions)	21.1
5	Internet Users (Millions)	19.2
6	International Internet Bandwidth Available (Gb/s)	862.8
7	Number of Undersea fiber cables at Kenyan Coast	4
8	Number of Universities / Enrollment 2014	66 / Approx 500,000
9	Number of Research Institutes	12

# KENET Governance

- KENET registered as a not-for-profit Trust
  - Vice Chancellors are Trustees + PS in Charge of Higher Education + CEO of ICT regulator
  - Strong governance structure with founder members as Trustees.
- KENET is a membership organization with a mission to catalyze research and educational reforms
  - Involved in capacity building and organizing research workshops
- KENET is the NREN of Kenya and licensed operator
  - It is financially sustainable through bandwidth and shared services

# Founder Member of UbuntuNet Alliance Regional REN

## 13 Member NRENs



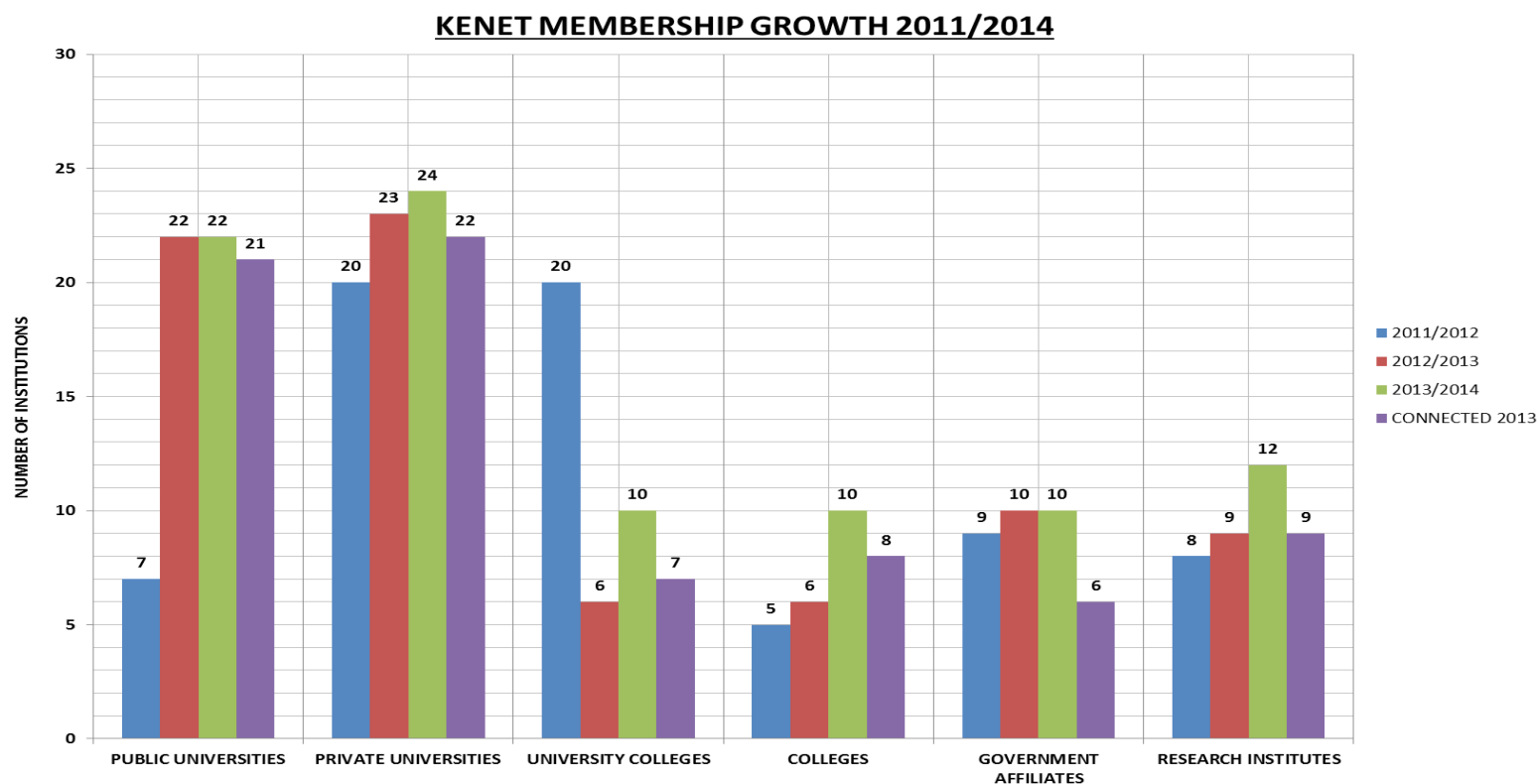
Eb@le, DRC  
EthERNet, Ethiopia  
\*KENET, Kenya  
\*MAREN, Malawi  
\*MoRENet, Mozambique  
XNet, Namibia  
\*RwEdNet, Rwanda  
SomaliREN, Somalia  
SudREN, Sudan  
\*TENET, South Africa  
TERNET, Tanzania  
RENU, Uganda  
ZAMREN, Zambia

*\* = founding member*

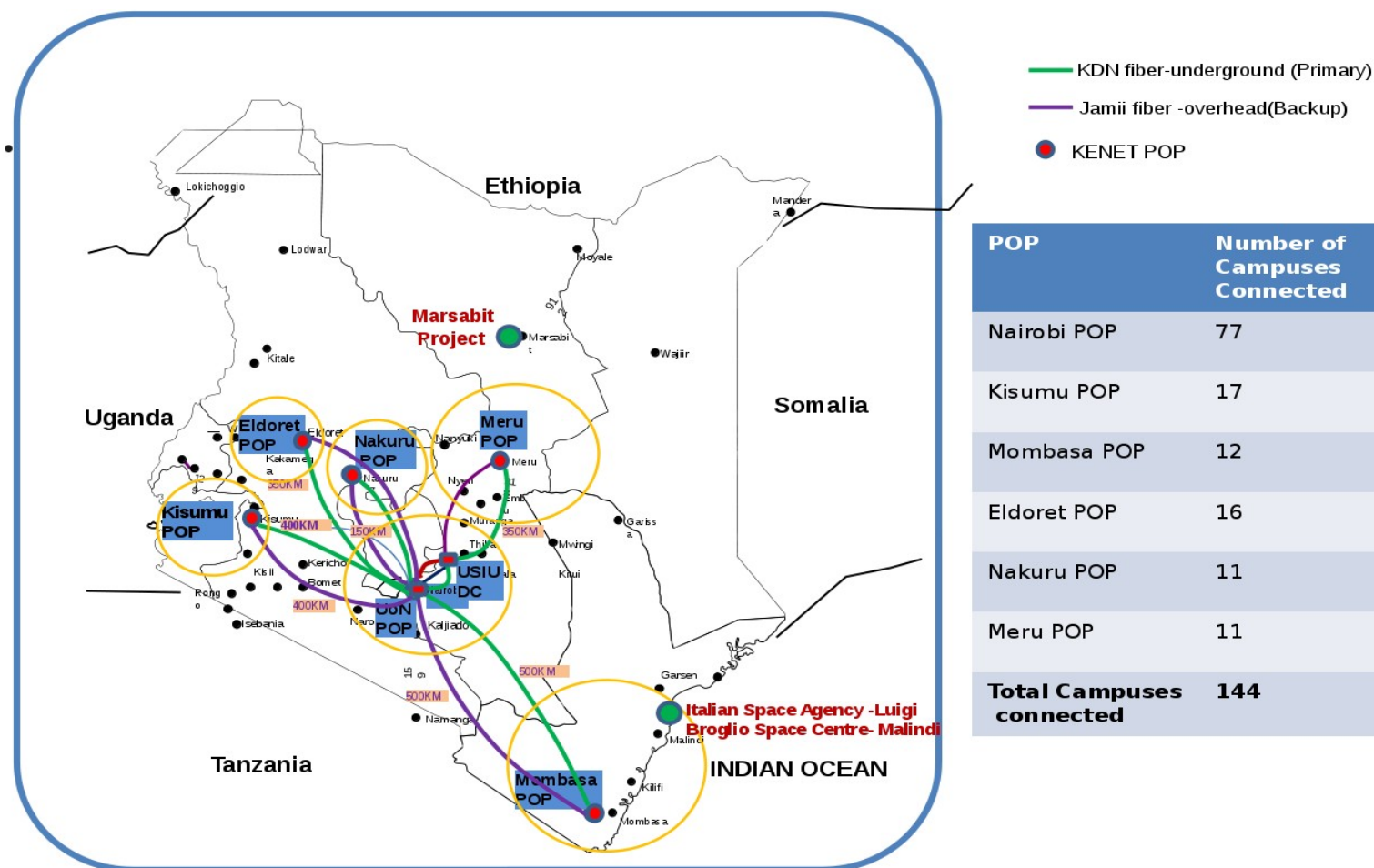




# Members of KENET 2014 (88)



# KENET Network Coverage March 2014



# Africa Connect Phase 1 Map



# KENET – Network Infrastructure and Data Centers

- Total Undersea Capacity of 4.35Gbps
- Total Distribution Capacity – 27,949 Mb/s
- 144 campuses connected, March 2014
- 36 campuses ( corresponding to 24% of all connected campuses) on over 1Gb/s KENET owned fiber connection
- Availability – target 99% and above
- 2Gbps Google and 0.3Gbps Akamai Traffic
- KENET is one of the largest IP broadband networks in Kenya and one of leading African NRENs



# KENET Data Centers

- 2 data centers 12km apart
- Tier 3 Level
- Physical access restricted to selected personnel
- Video Camera surveillance
- Services Hosted:
  - Measurements Lab (partnership with Google)
  - Google Cache
  - RIPE Atlas Network Probe
  - Web-hosting, disaster recovery, e-mail, and co-location of e-learning servers, DNS, NMS etc



# Technical Capacity of KENET

## **NOC Team**

- Helpdesk handles level 1 support, call handling and initial diagnosis
- Helpdesk assisted by ticketing system
- Escalation to level 2 support within 1 hour
- Escalation procedure to senior management within 6 hours

## **Data Center Team**

- Handle Data center and shared services
- Handle general data center maintenance and calls

## **Fiber & Network Development Team**

- Two full time staff

## **Cyber security & Cyber infrastructure Team**

- Handle network security incidences
- Manage KENET CERT/CIRT

## **Training Team**

# KENET and Ei4Africa.eu Collaboration

- Start of implementation on 3rd March 2013
- Deployment of CA and IdF at KENET starts
- Through support from ei4africa we have managed to set up the KENET CA
- CP/CPS document prepared and uploaded for review

# Introduction cont'd

- KENET CA will cover the national academic and research community including national and international Grid activities

# KENET iDP deployment

- The KENET Catch-All Identity Provider (<https://idp.kenet.or.ke>) is a service developed in collaboration with the ei4Africa project
- IDP based on Shibboleth from Internet2
- The iDP will be used for Access to the Africa Science gateway by users on KENET network
- IDP Uptake still low

# CoMoDO wildcard certificate services

- CoMoDO issuing \*free\* one-year wildcard certificates
- CoMoDO certificates allow for the deployment of official federated identity services therefore allow us to join eduGAIN
- 5 KENET members (KENET included) using the CoMoDO certificate for mainly websites and mail servers



# KENET CA Certificate Policy & Practice Statement (CP & CPS)

- Version 1.0.0 – February 2014
- Structured as per RFC 2527
- Waiting for reviewers

# KENET CA Setup

- KENET CA is a self signed root certification authority. It doesn't issue certificates to subordinate CA's
- KENET CA issues certificates to mainly research and higher learning institutions
- CA system consists of 2 servers
  - Off-line CA signing server
  - One online web server (online repository)

# KENET CP & CPS

- KENET CA will operate in accordance with all provisions of CP and CPS
- KENET CA operates a secure on-line repository (<https://ca.kenet.or.ke>)
- The on-line repository runs with an availability of 24x7, liable to reasonable scheduled maintenance
- Interpretation of CP and CPS is subject to Kenyan Law

# KENET CP & CPS - Identification and Authentication

- Subject name is of the X.500 name type whose parts are encoded as Printable Strings
- Subscriber name must be meaningful and unique
- Subscriber is authenticated de visu
- Re-key before expiration provided the last identification in accordance with section 3.1.9
- Revocation request only through signed emails by owner

# Physical, Procedural & Personnel Security Controls

- CA operates in a controlled environment at KENET University of Nairobi data centre
- Physical access restricted to authorized personnel
- Building under CCTV surveillance
- The building has fire alarm system



# Physical, Procedural & Personnel Security Controls cont'd

- Team of 4 engineers dedicated to managing CA
- All engineers have attended trainings on PKI infrastructure

#	Name	Job Title (Years Experience)	Bachelors Degree
1	Kennedy Aseda	Senior Network Engineer (6)	Electrical Engineering
2	Peter Muia	Lead Research Services and cyber-security (5)	Computer Science
3	Hezron Mwangi	Lead Shared Services (4)	Electrical Engineering
4	Ronald Osure	Applications Developer (3)	Computer Science

# Computer Security

- Operating systems maintained at a high level of security by applying all recommended patches
- Monitoring to detect unauthorized software changes
- Services reduced to a bare minimum
- Machines protected by firewall
- Machines used for signing certificates isn't connected to any kind of networks

# Certificate Types

- User certificate (people)
- Host certificate (computers)
- Service certificate

# Who can apply for a certificate?

- Users affiliated to KENET member organization
- Hosts administered by the requesting KENET member and
- Services provided on a host that is administered by a KENET member

# How do we discover researchers?

- Through mailing lists tailored for particular sector e.g. health, agriculture
  - Research champions mailing list
  - Health experts champions
  - ICT researchers
- Through nominations by Vice Chancellors /Principals of Universities
- Conferences and workshops organized in partnership with KENET
  - UbuntuNet Connect 2011, IST-Africa 2013, Horizon 2020 awareness workshop
- Reputation – researchers approaching KENET



# International research and doctoral programs in Kenya

- 12<sup>th</sup> IBM Research – Africa Lab physically located at Catholic University of Eastern Africa
  - Promoting research in Africa including doctoral research
- About 7 fully-fledged research universities in Kenya offering doctoral programs
  - Computer science, health sciences, Chemistry, Physics, engineering, agriculture, mathematics etc.
  - Joint PhD programs with universities in Europe and US
- International research institutions supervise doctoral students in biomedical fields, agriculture etc
  - (e.g., KEMRI – Wellcome Trust or International Livestock research Institute is part of CGIAR)

# How we plan to administer KENET CA services

- The KENET CA is managed by KENET
- KENET CA will operate in accordance with all provisions of the CP and associated CPS submitted

# Other important issues

- Certificate life time is one year
- Audit logs maintained for 3 years
- Logs of signing machine copied to removable media and kept in a safe
- Relevant CPS published on CA website and submitted to EuGridPMA

# Conclusions

- Kenyan researchers can now access the Africa Grid Science Gateway and need access to other Science Gateways
  - Increased awareness workshops in 2014-2015
- KENET members can also deploy grid infrastructures and open access repositories that will need certificates
  - The research institutes in Kenya have scientific databases that they want to share
  - Universities in setting up open access repositories
- KENET promotes joint research projects with Kenyan, African and European partners
  - Participating in Horizon 2020 Call for Proposals
  - MoU with DFN allows joint research projects

Q & A

**Thank You!**

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