



# KENET Community (2000 – 2027)

## *Does KENET membership (still) matter?*

*A Presentation at the 2021 Hol forum*

*December 14, 2022*

*Meoli Kashorda, B.Sc. (EE, UoN), PhD (ESE, University of Essex), MIEEE, MIET*

*Executive Director, KENET and*

*Professor of Information Systems, USIU-Africa*

[mkashorda@kenet.or.ke](mailto:mkashorda@kenet.or.ke)

*Transforming learning research and working  
environments with ICT*

# Agenda

- KENET Governance and Management
- KENET Membership Categories and the KENET Community
- What have been the benefits of KENET membership 2000 – 2022?
- What will be the Top 10 ICT issues in 2023
- The future of KENET as a membership organization
  - ***Does KENET member still matter in strategic plan period 2022 – 2027?***

# KENET Governance and Organization

# KENET Governance

- KENET was constituted as a **not-for-profit** TRUST in November 2000 (*Trustees (perpetual succession) Act Cap 164*)
- KENET Trust has 13 Trustees Slots (2<sup>nd</sup> supplemental Trust Deed)
  - Seven Vice Chancellors + CEO of research institute; PS, MoE; DG CA; 2 Private sector representatives + Principal of a Tertiary college (see current <https://www.kenet.or.ke/node/10> for biographies or the handout)
  - Chair is Prof Isaac Kosgey, VC, Moi University since October 2021 (former Chair was Prof Paul Zeleza, VC, USIU-Africa)
  - *Two slots reserved for Independent Trustees from private sector (Mrs. Sheila Muia from HR )*
- BoT supported by a Management Board (13 slots)
  - Chair is Prof Alice Mutungi, Dean School of Medicine, KeMU
  - *Three slots reserved for independent members from private sector*
- **KENET board has 26 slots with only five independent board members – because we are a membership organization!**

# KENET Board of Trustees (min 7, Max 13)

|  | Name / Title            | Position on the Board                  | Position in nominating institution  |
|--|-------------------------|--|---|
| <b>Founder Member Representatives</b>                                    | Prof. Isaac Kosgey      | Chairman                               | VC, Moi University  |
|  | Prof. Victoria Ngumi    | Vice - Chairman                        | VC, JKUAT   |
|  | Prof. Stephen Kiama     | Treasurer                              | VC, UoN   |
|  | Prof. Laban Ayiro       | Trustee & Chair Audit & Risk Committee | VC, Daystar University  |
|  | Prof. Margee Ensign     | Trustee                                | VC, USIU-Africa   |
| <b>Ministry of Education Representative</b>                              | Vacant                  | Trustee                                | To be appointed in 2023; Dr. Mwakima, PS, State Department for VIT ceased being a trustee in November |
| <b>Communications Authority Representative</b>                           | Mr. Ezra Chiloba        | Trustee                                | DG, CA  |
|  |                         |  | <b>Other Representative Institution</b>   |
| <b>Public and Private Universities' Representatives</b>                  | Prof. Laila U. Abubakar | Trustee                                | <i>Vice – Chancellor</i> , Technical University of Mombasa (TUM)                                      |
|  | Dr. Stanley M. Bhebhe   | Trustee                                | <i>Vice – Chancellor</i> , Africa Nazarene University (ANU)   |
| <b>Research Institutes Representative</b>                                | Vacant                  | Trustee                                | To be appointed in 2023; Prof Njiru, Director/CEO , KMFRI ceased being a Trustee on November 27, 2022 |
| <b>2 Private Sector (Excluding Private universities) Representatives</b> | Mrs Sheila Muia         | Trustee                                | Second and final term   |
|  | <b>Vacant</b>           | Trustee                                | <i>To be Appointed – Business or Finance professional</i>   |
| <b>Tertiary Colleges' Representative</b>                                 | Mrs. Catherine Kelonye  | Trustee                                | The Chief Principal, Kisumu National Polytechnic  |

# KENET Management Board (min 7, Max 13)

|  | Name / Title            | Position on the Board  | Position in nominating institution   |
|--|-------------------------|------------------------|--|
| <b>Founder Member Representatives</b>                                    | Dr. Masibo Lumala       | Member                 | Director, IODEL, MU  |
|  | Prof. Stephen Kimani    | Member                 | ICT director and Associate Professor of Computing, JKUAT   |
|  | Mr. Paul Kariuki        | Member                 | ICT director, UoN  |
|  | Mr. Solomon Mburu       | Member                 | ICT Manager, Daystar University  |
|  | Dr. Paul Okanda         | Member                 | ICT director and Associate Professor of Computing, USIU-Africa   |
| <b>KENET management</b>  | Prof Meoli Kashorda     | Member (and secretary) | Executive Director, KENET  |
| <b>Public and Private Universities' senior faculty representatives</b>   | Vacant                  | Member                 | <i>To be nominated from public university in 2023. Reserved for an engineering or applied sciences senior faculty member</i> |
|  | Prof Alice Mutungi      | Chair of MB            | <i>Dean, School of Medicine, KeMU</i>  |
| <b>Research Institutes Representative</b>                                | Dr. Robinson Mugo       | Member                 | Project Manager, SERVIR, Remote Center of Mapping for Development (RCMRD)  |
| <b>3 Private Sector (Excluding Private universities) Representatives</b> | CPA Mrs Cathrine Juma   | Member                 | <b>Centwise Business Consulting</b>  |
|  | <b>Two Vacant slots</b> | Member                 | <i>To be Appointed in 2023 from engineering and legal professions</i>  |
| <b>Librarian</b><br>Meoli Kashorda                                       | Mrs. Irene Nyakweba     | Member                 | University Librarian, Kisii University   |

# KENET Organization - small organization mainly of high-end engineers and application developers

| Financial Year | Total KENET Staff |
|----------------|-------------------|
| 2015/2016      | 42                |
| 2016/2017      | 37                |
| 2017/2018      | 39                |
| 2018/2019      | 42                |
| 2019/2020      | 39                |
| 2020/2021      | 37                |
| 2021/2022      | 40                |
| 2022/2023      | 50                |

KENET HQ hosted by UoN, JKML

Other offices and equipment rooms hosted by universities – USIU-Africa, CUEA, TUM, Maseno, Moi, KeMU, Egerton

Low-cost model

KENET leverages on the ICT organizations of member institutions

**KENET PoP administrators** for Different regions – Mombasa Nakuru, Eldoret, Kisumu, Nyeri Meru

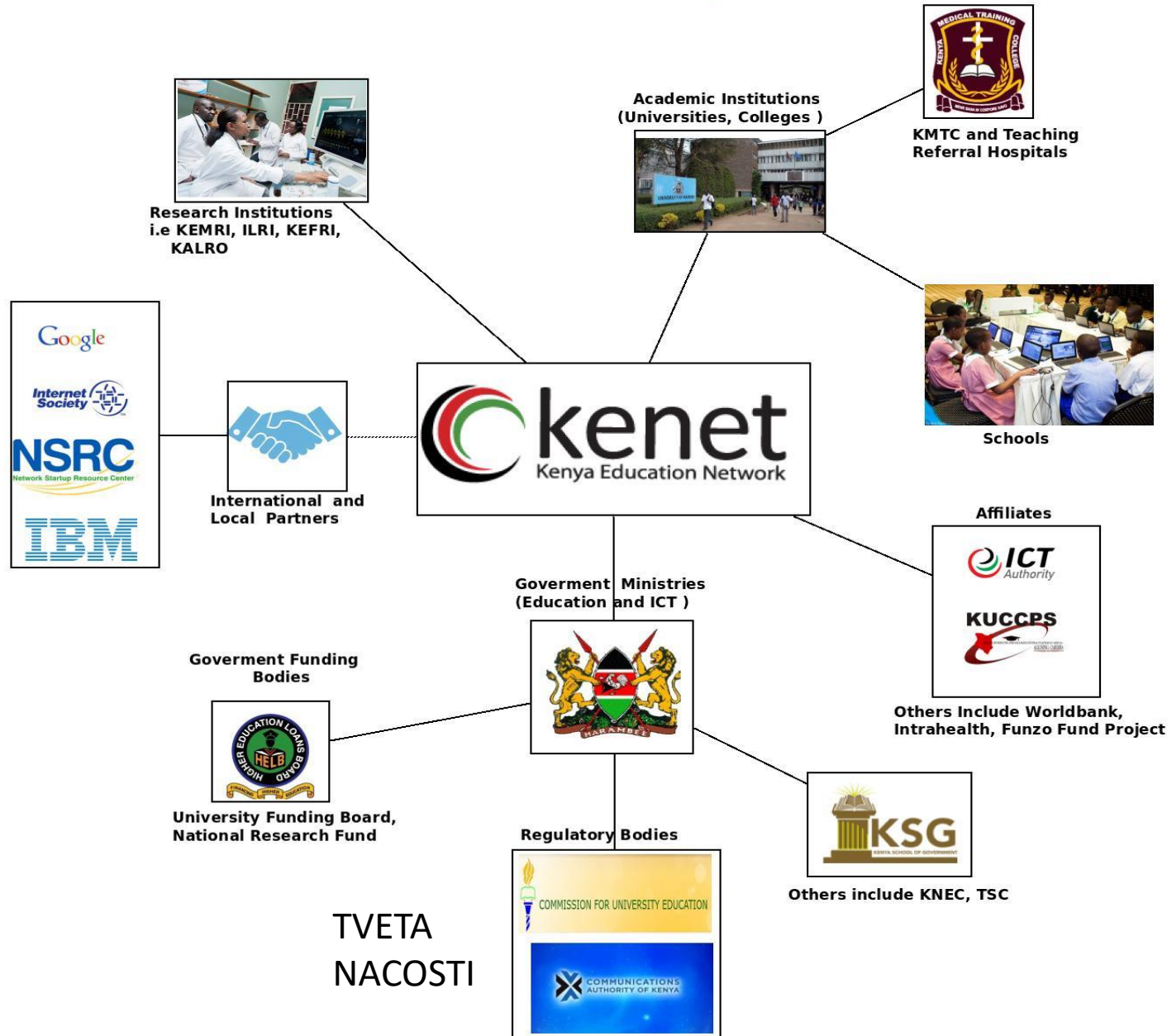
## The KENET Academic Community And Partners

Global IT business partners  
 Microsoft Azure;  
 AWS; HP  
 Meta (Facebook)  
 Telecom Infra  
 Project Africa

FCDO (formerly DFID)  
 USAID

**Industrial partner Labs**

IBM Africa research lab  
 Microsoft Africa Research Institute



TVETA  
 NACOSTI

CEMASTE  
 Tunapanda  
 AfCHIX

# KENET Membership Categories (August 2022)

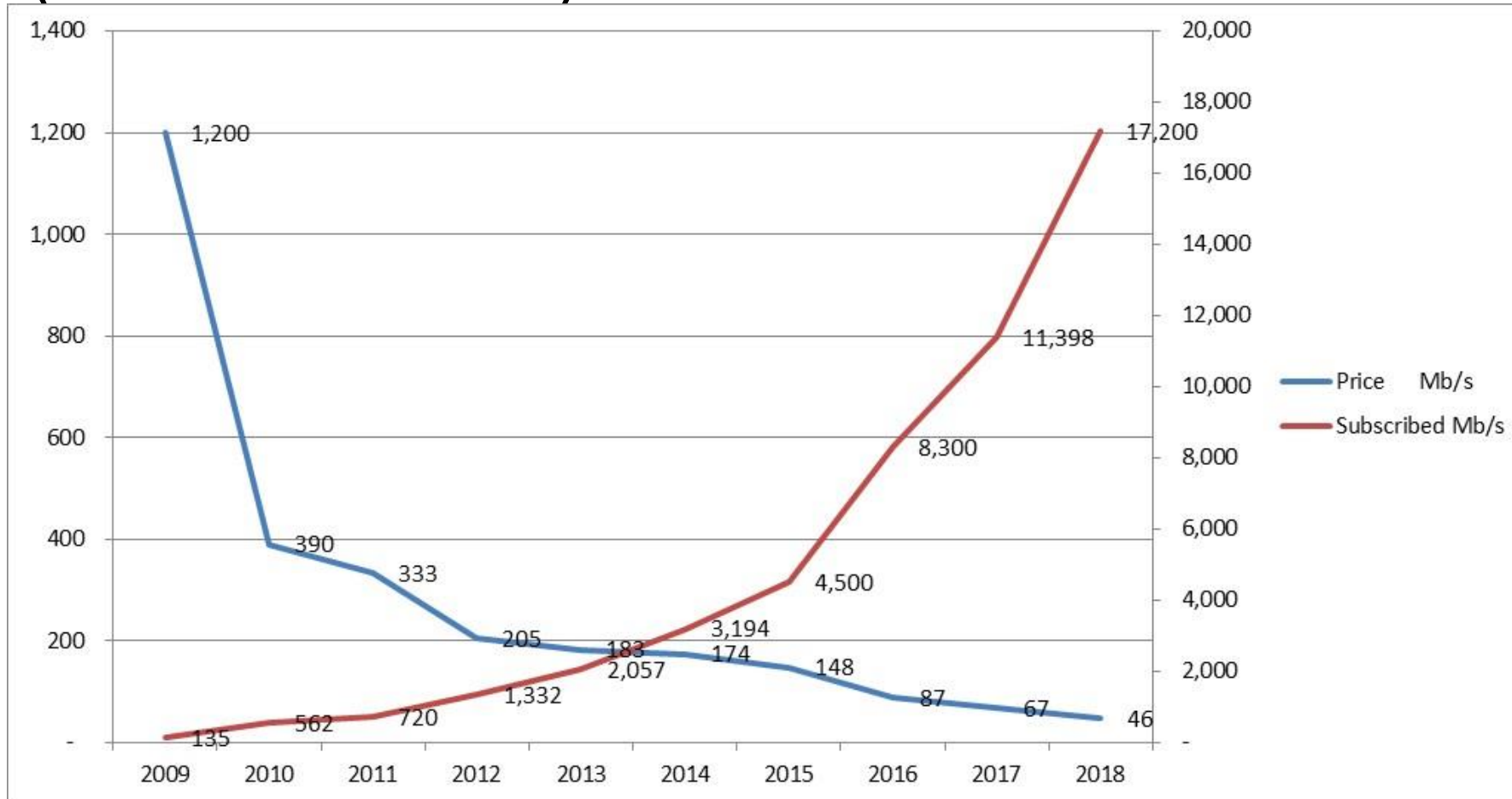
| S/No. | Category                       | 2022 Membership Status         |  |  |
|-------|--------------------------------|--------------------------------|--|--|
|       |                                | Total Number of Members (2022) | Total Number of Connected Members (2022) | Campuses (Connected) as at August 2022 |
| 1     | Public Universities            | 36                             | 36                                       | 122                                    |
| 2     | Privates Universities          | 32                             | 29                                       | 61                                     |
| 3     | Tertiary Colleges              | 60                             | 55                                       | 69                                     |
| 4     | Teacher Training Colleges      | 13                             | 13                                       | 14                                     |
| 5     | Medical Colleges               | 4                              | 4  | 79                                     |
| 6     | Teaching Hospitals             | 8                              | 8  | 24                                     |
| 7     | Research Institutes            | 20                             | 20                                       | 52                                     |
| 8     | Capacity Building Institutions | 7                              | 6  | 15                                     |
| 9     | Affiliate Institutions         | 22                             | 20                                       | 36                                     |
|       | <b>Total</b>                   | <b>202</b>                     | <b>191</b>                               | <b>472</b>                             |

What has been value of KENET membership  
(2000 – 2022)?

# 1. Affordable and reliable Internet connectivity

- **KENET is licensed by CA to build and operate academic network of Kenya since 2002 (on behalf of member institutions)**
  - Educational institutions – universities, tertiary colleges, capacity building institutions, and schools and affiliated institutions
  - Research institutes and affiliated institutions
  - Teaching hospitals
- Founder and shareholder of KeNIC, the .ke domain registrar
  - Others are ICTA, DRAKE, and TESPOK
- Developing **complex** last mile connections protected solutions for member institutions
  - E.g., extending dark fiber to JOOUST, KAFUCO, SEKU, Tenwek, KUTRRH, ILRI Kapiti
- Building reliable national backbone network (not infrastructure) using leased infrastructure (from KPLC, ICTA, Liquid, Safaricom, FON, Telkom, Jamii)
- Resilient **dedicated** international undersea cable connectivity – SEACOM IRU (asset), EASSy, and DARE cable for resilience
- *High-speed = minimum of 1,000 Mb/s (1 Gb/s) per campus; 10 Gb/s for large universities; backbone operating at 100 Gb/s!*

# Weighted unit price vs. subscription capacity (2009 – 2018)



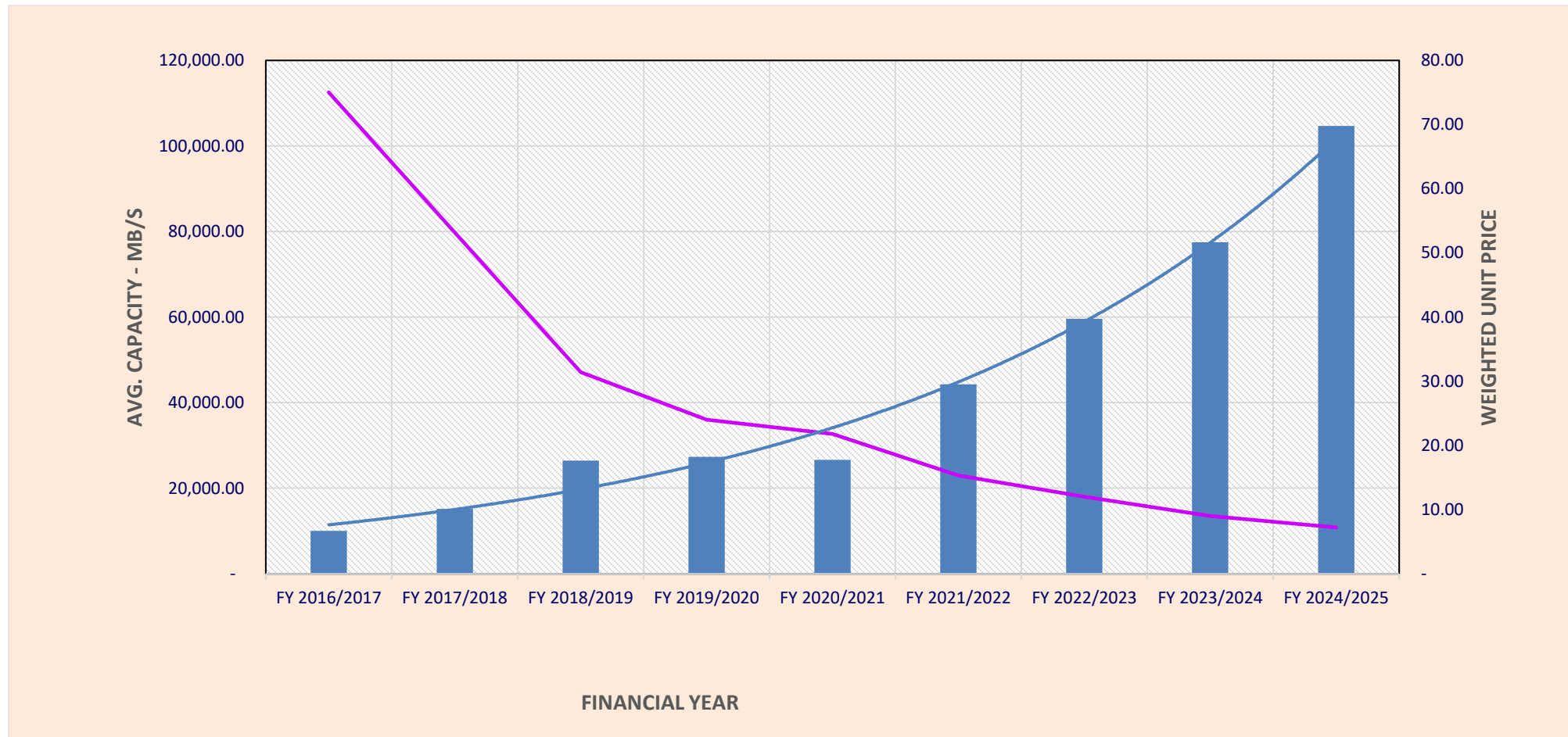
**October 2022**

Total capacity = 57 Gb/s

Minimum price = \$6 per Mb/s

Weighted unit price = \$14 per Mb/s

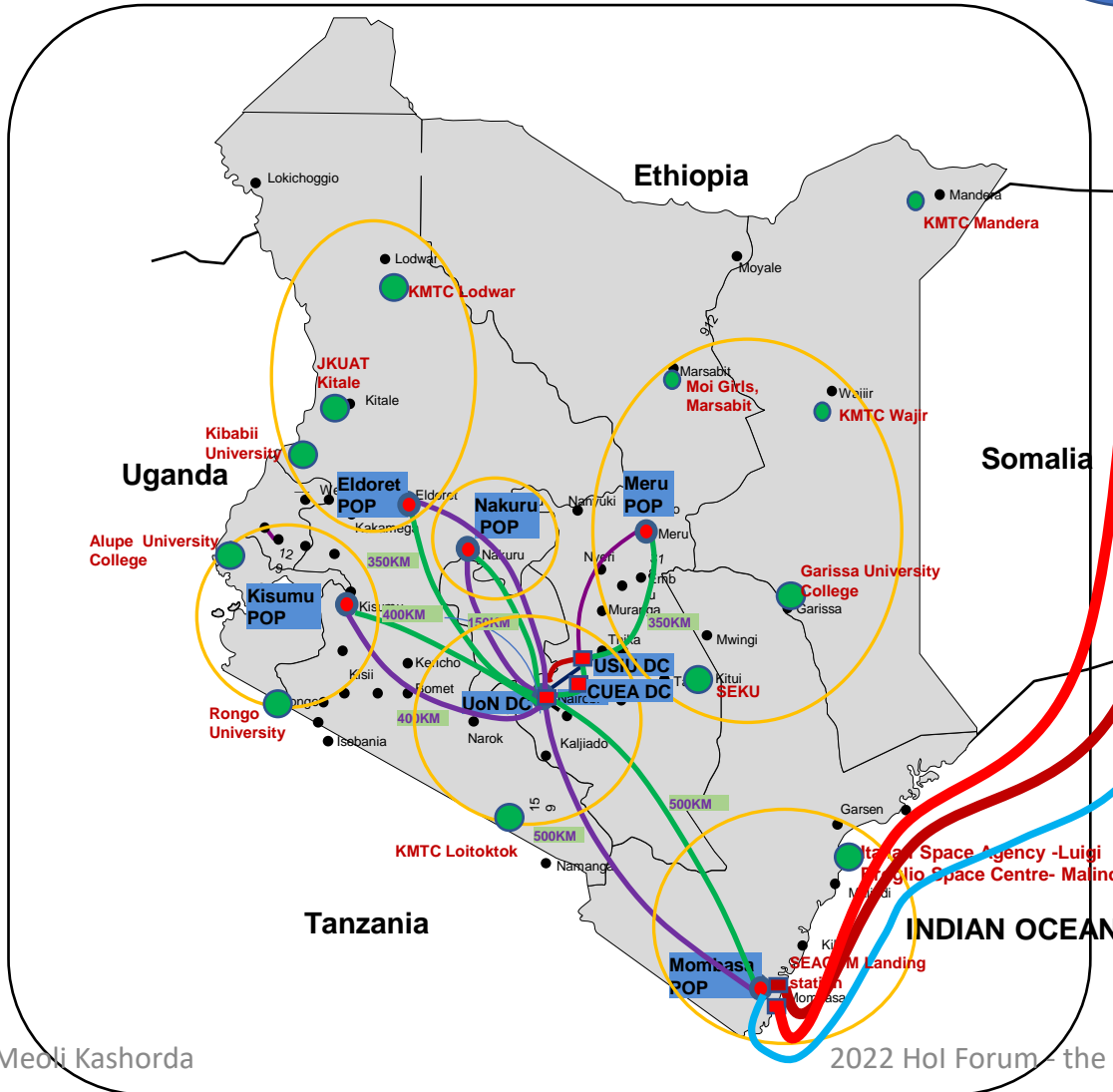
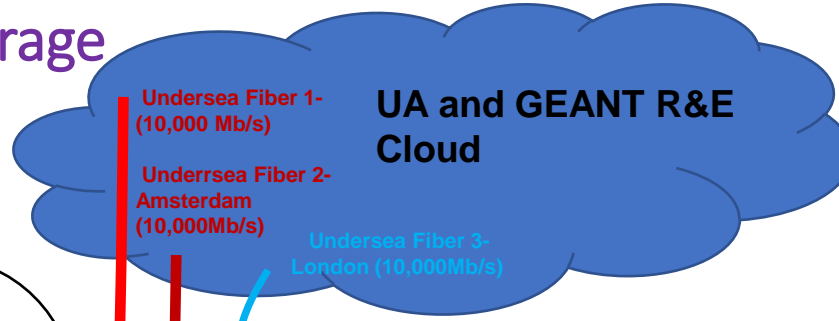
# Weighted Average Unit Internet Prices 2016 - 2025



# KENET National Broadband Network Coverage



KTCIP \$22.5 million = 55 campuses + data centers



| POP                             | No. of Campuses Connected | No of Schools connected |
|---------------------------------|---------------------------|-------------------------|
| Nairobi POP                     | 326                       | 28                      |
| Kisumu POP                      | 42                        | 0                       |
| Mombasa POP                     | 17                        | 1                       |
| Eldoret POP                     | 27                        | 0                       |
| Nakuru POP                      | 19                        | 0                       |
| Meru POP                        | 25                        | 0                       |
| <b>Total Campuses connected</b> | <b>456</b>                | <b>29</b>               |

Sustainability Plan of 2008!

55 → 472 campuses  
Renewal of data center equipment

| Metric                                      | No      |
|---|---------|
| No. of Counties with connected members      | 46      |
| Total no. of campuses on KENET fiber        | 147     |
| Total no. of Campuses on Fiber Leased Lines | 139     |
| Total no. of Campuses on KENET owned radios | 45      |
| Total KPLC Fiber lease distance             | 1208 KM |
| Total NOFBI dark fiber distance             | 1357 KM |
| Total KENET dark fiber distance             | 3362 KM |

Community funding!

## 2. ICT Capacity building for Member institutions

- **Convening forums for senior leadership** of member institutions with different themes
  - Technology-based innovations
  - Understanding Top ICT issues (e.g., cybersecurity awareness and maturity, data protection, ERP deployment etc)
  - Understanding institutional digital transformation; Blended learning
  - Towards Open Science practices and platforms
- **Hands on Institutional ICT staff training**
  - Scalable campus networks, cybersecurity, network management, cloud computing, LMS server setup and administration
  - This was primary activity of KENET in the period 2000 – 2008 when national network was non-existent and/or the international satellite bandwidth was very limited
- **Hands on capacity development for faculty and researchers**
  - Blended learning, Machine Learning, data science, research computing, open science practices/platforms

# 3. Advanced technical advisory services

- KENET engineers have provided support for setting campus network and WiFi for member institutions
  - Designed, developed RFPs and provided project management for new universities (KyU, U of Embu, Chuka U, MUST or U of Kabianga)
  - Network audit reports
- Cybersecurity Emergency Response Team (CERT) – KENET engineers and experienced ICT staff
  - *Penetration testing, recovery from a successful breach etc.*
- Developing guidelines for LMS server setups and configurations
- Developing software appliances for researchers and faculty

## 4. Attracting equipment donations and direct engineering support

- In last 13 years, KENET has received donations of refurbished network equipment from NSRC at the University of Oregon
  - KENET in turn donates to member institutions
  - The last donation was in May 2022
- Direct Engineering Support includes equipment donations and most important donated KENET engineers time
  - Improves the campus network
  - Many members have been benefited – based on need assessment of KENET
- Latest DES was an KES 10.5 million Open WiFi installation at KU for hostels that accommodate up to 5,000 students
  - Equipment partially donated by Meta / TIP Africa (25% KENET, 75% TIP Africa)

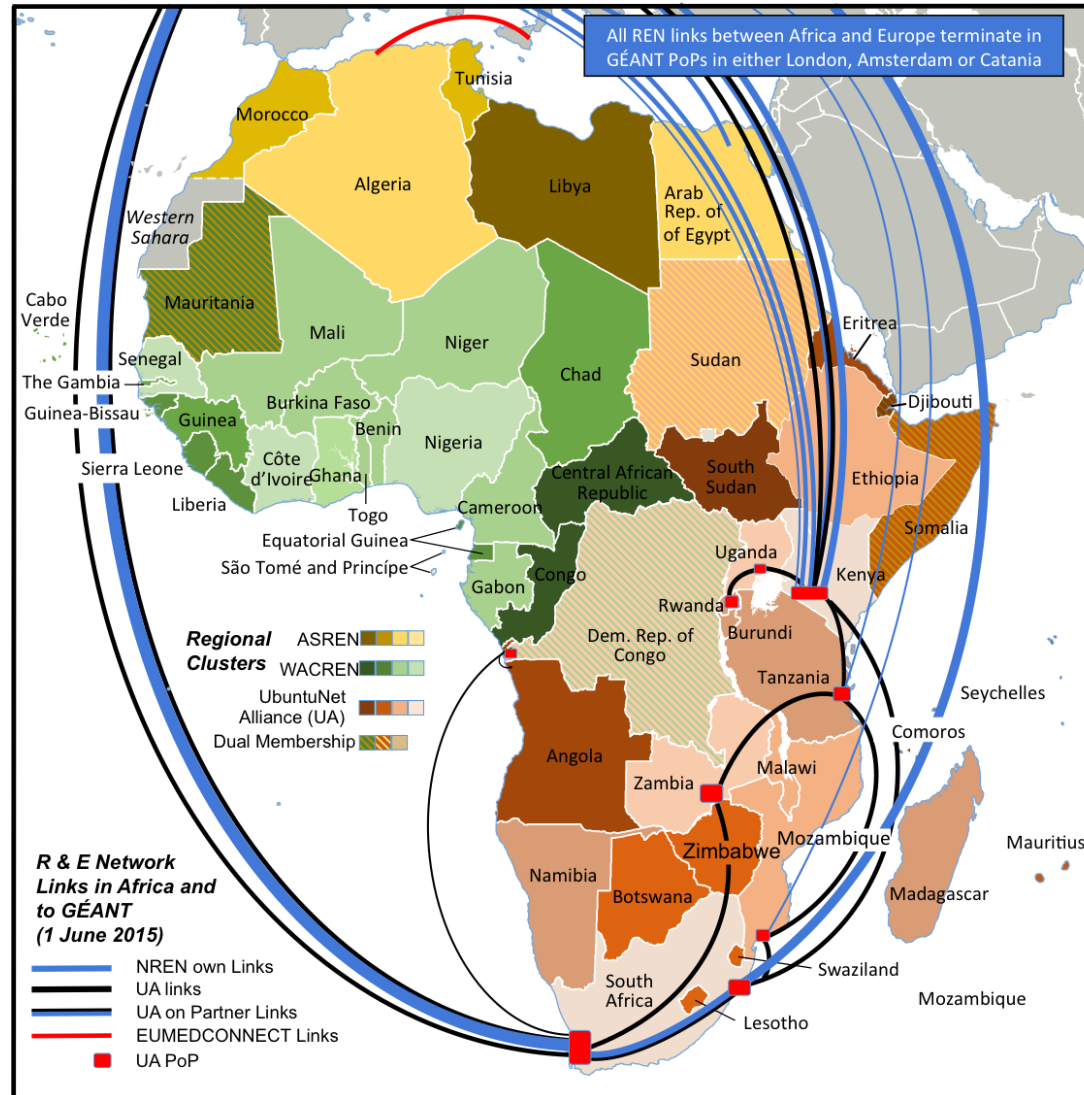
# 5. Attracting grants for donors, development partners and government for member institutions

- KENET was formed because of a USAID grant of \$1.1 million in 1999/2000
  - Used for last mile radio links and to expand Telkom network
- First \$500,000 VSAT gateway grant in 2005 for KENET members – financed by Rockefeller Foundation
- 2007 - \$22.5 million – GoK of Kenya grant for 55 member institutions
  - First national R & E built using the grant; all assets held in trust by the KENET
- 2014 - \$200,000 Google grant for last mile connectivity and WiFi for up to 10 member institutions (included SEKU WiFi, Rongo Last mile link, MMUST last mile fiber)
- December 2020 = KES 39 million grant from FCDO for KMTC – senior leadership training, faculty development and e-readiness and cybersecurity assessment
- December 2022 = \$200,000 BOLT grant (Internet foundation grant) for connecting 20 institutions in neighborhood of rural universities
  - Schools, hospitals, library, and TTC.
- **KENET listed as one of the beneficiaries of the World Bank Kenya Digital Economy Acceleration Project (KDEAP) - \$30 million??**

# 6. Advanced educational technology and research services

- Working Group on Exam Proctoring and Student Laptops
- EdTech innovations on the use of Raspberry Pi (pocket computers worth KES 5,000) for teaching computer science and engineering
- EdTech innovations on setting up Internet of Things teaching labs
- 12 Research grants per years for early career PhD faculty / researchers (up to KES 1.5 million per research team)
  - In priority research areas of applied sciences, computer science, and engineering in past 8 years;
  - Only data-intensive research areas supported
- Travel grants for graduate students and faculty in STEM areas (up to KES 200,000 per grant)
- **Towards setting up Africa Open Science Platform Node for EAC countries**
  - To support African and global research collaboration

# KENET Connected to other African and Global RENs for enhanced collaboration



# Research engagement - Research mini-grants for early-career faculty with PhDs

- KENET BoT established a research fund in 2009
- Fund has been used to **catalyze** research or innovations in Engineering, Computer Science, and Educational Technology
- 2014 – Raspberry Pi for teaching engineering / computer science (<https://raspberry.kenet.or.ke>). 4 university teams
  - UoN, DKUT, Meru, USIU
- 2017 – Remote teaching projects – mini-grants to 3 university teams
  - UoN, Daystar, CUEA
- 2018 – 2 university teams in Big Data; 2 university teams in Distributed Ledger Technology (blockchain)
  - UoN, ANU, Muranga/Meru, Strathmore U
- 2019 – Computational Modelling / Materials Science min-grants; Agriculture Research?
  - *Call for Proposals in November 2018; researchers' mailing list and KENET website*
- 2020 – 4 university team received EdTech innovation grants to support engineering and CS education
- 2022 - 11 Teams awarded KENET grants to CS/IS, computational modelling and material science, and engineering
  - *Young PhD project leaders were from 7 member institutions – DKUT, Maseno, JKUAT, UoN, ICIPE, Kabarak, Strathmore*
- *Next Call for Proposals in January 2023*

# Digital Infrastructure to support Educational Technology Services

- Setup Virtual Lab in Community Cloud
  - For faculty who need to teach specialized course / use applications and require “virtual” machines or servers
  - Use cases in Computer Science and Engineering
- Online High-End Computer Networking Lab
  - Used by faculty from anywhere in KENET member institutions
- Shared lab instruments could also be established at KENET data centers
- FREE Cloud-based Web Conferencing platform for member institutions
- **Customization and Hosting of Institutional E-learning Platforms**

# KENET research ICT services

- **Research services require broadband connectivity and low-congestion networks.**
- WiFi and high-speed Internet services top priority for researchers
  - **eduroam – (EDUcation Roaming) secure WiFi for researchers**
  - Most member research institutes, universities and hospitals on last mile fiber at 1 Gb/s or above – e.g., KyU, U of Embu, Chuka, Tenwek Hospital, CEMASTEAM, SEKU, TTU
- **Critical elements for supporting research ICT services:**
  - **Identity Provider** for KE researchers (necessary for access to research resources worldwide)
  - **Digital certification authority** (accredited by EUGRIDPMA in January 2016)
  - **Community Cloud Infrastructure (hosting KE research cloud)**
  - High-end engineering and ICT talent to develop and manage the advanced e-infrastructures
- **Identity + Trust services (RAFIKI.KE, the identity federation of Kenya)**

# 7. Benchmarking and research-based advocacy

- **Biennial e-readiness surveys since 2006**
  - Participation has been restricted to chartered universities only; extended to KMTC in 2021 with funding
  - Data used for benchmarking and institutional ICT strategic plans
- **Annual core data for all member institutions**
  - See the 2021 annual core data report
- **Biennial Departmental surveys** (only engineering and computer science now)
- Data used for Institutional ICT strategies and for advocacy with donors, government and partners
  - *E.g., departmental data on engineering and CS graduates used to influence Microsoft and IBM to setup labs and development centers in Kenya.*
- **KENET developing a benchmarking and platform**
  - How many systems administrators, what ERP, LMS? What salaries for ICT staff? How many?
- **Funded through KENET research fund - 2% of Connectivity revenue**

# Research-based benchmarking and advocacy – Annual Core Data (2021 results)

| E-readiness Sub-indicator  | Performance for universities | Performance for tertiary colleges |
|--|------------------------------|-----------------------------------|
| 1. Availability of Internet bandwidth (Mb/s per 1,000 users)                   | 40.5                         | 10.3                              |
| 2. Affordability (% of Internet expenditure to total recurrent expenditure)    | 0.8%                         | 1.9%                              |
| 3. Degree of deployment of administrative information systems (ERPs)           | 51%                          | 25%                               |
| 4. Security of information systems   | 21%                          | 3%                                |
| 5. Availability of critical ICT staff (median number of staff per institution) | 3                            | 1                                 |
| 6. Annual internet expenditure as a percent of student ICT lab fees            | 31%                          | Not surveyed                      |

# Who has been funding the development of the advanced national digital infrastructure (2012 – 2022)?

KENET is a not-for-profit organization

Surplus invested in the network

**Sustainability Plan of 2008 – approved by World Bank and ICTA**

# Incremental growth of 2007 – 2013 KTCIP/ World Bank funded network / cloud infrastructure

| FY        | Amount - Kes   | Comments   |
|-----------|----------------|--|
| 2011/2012 | 68,815,587.77  | KTCIP / KENET  |
| 2012/2013 | 21,680,580.27  | KTCIP / KENET  |
| 2013/2014 | 453,597,758.02 | KTCIP funding  |
| 2014/2015 | 148,043,716.73 | KENET  |
| 2015/2016 | 125,481,196.63 |  |
| 2016/2017 | 148,330,255.38 | Community cloud upgrade                                  |
| 2017/2018 | 91,415,684.52  |  |
| 2018/2019 | 59,175,410.23  |  |
| 2019/2020 | 58,117,632.30  |  |
| 2020/2021 | 161,168,389.28 | Community cloud upgrade / Core network equipment renewal |
| 2021/2022 | 68,551,178.67  | KENET  |

# What is the future of KENET as a Membership organization

KENET strategic plan 2022 – 2027

# KENET vision, mission, motto (2022-2027)

## ***Vision***

***Be an academic community significantly contributing to the achievement of high research and innovation productivity levels of Kenya***

## ***Mission***

***To support digital transformation and digital inclusion of member institutions.***

## ***Motto***

***Transforming learning, research and working environments using digital technologies***

# Strategic Themes

## 1. Digital Infrastructure

- Includes digital campus infrastructure expansion and upgrade

## 2. Institutional capacity

- Governance + HR + financial sustainability

## 3. Members and Stakeholders

- Includes the government as a stakeholder
- Member categories – universities, research institutes, tertiary colleges, teaching hospitals

# Strategic Themes (continued)

## 4. **Digital connectivity and enterprise services**

- Internet connectivity – on- and off-campus
- Digital enterprise services – hosting ERPs and administrative applications, DR sites, new innovative services

## 5. **EdTech and research services**

- Academic cloud services
- Capacity building for faculty, researchers, instructional designers on use of digital technology in teaching, learning and research
- Catalyzing research and innovation using small grants program

## 6. **Member services**

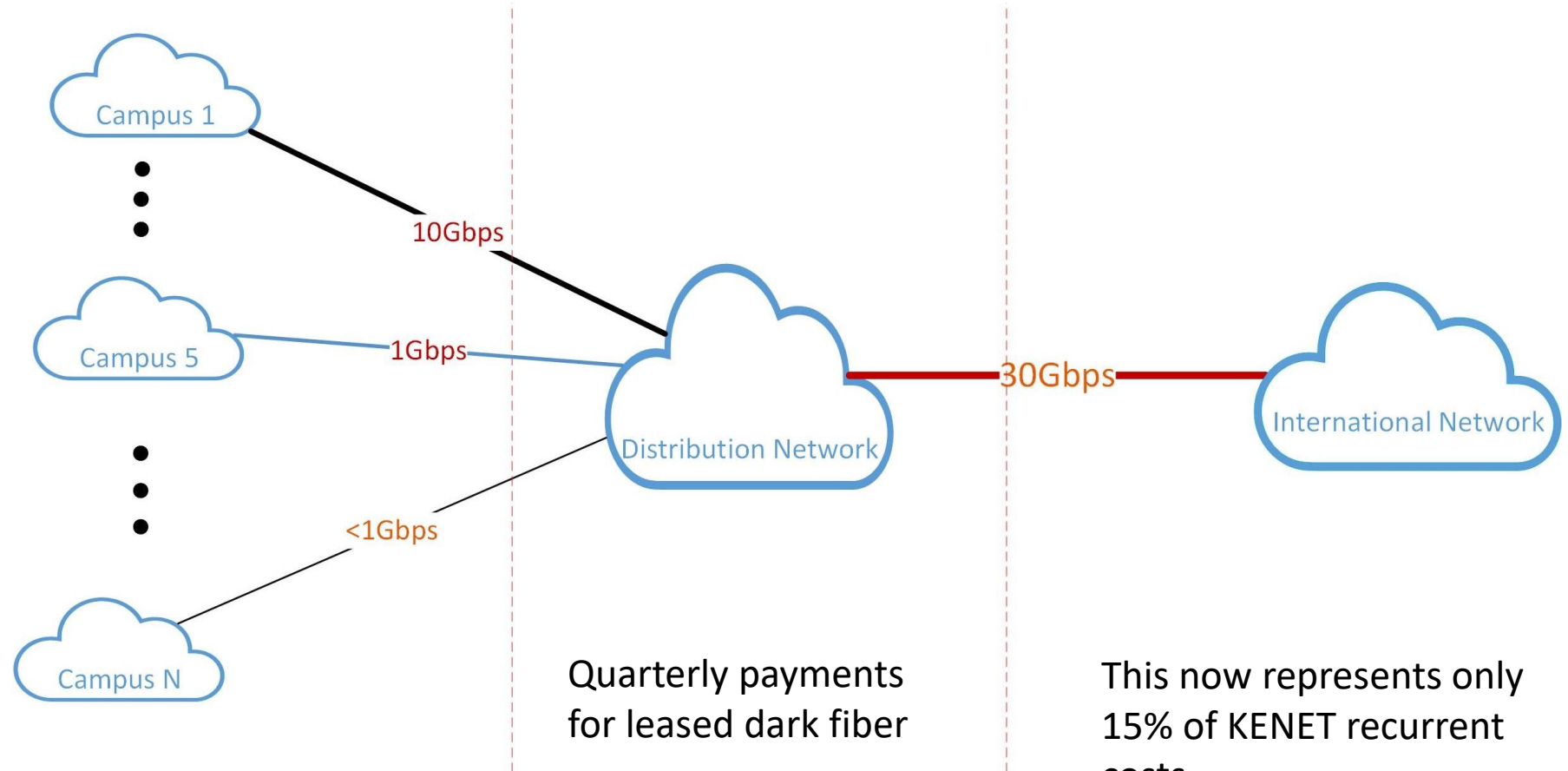
- Data & knowledge/research services
- Convening and Forums for senior leadership of member institutions
- Guidelines and policies for ICT governance, ERP implementation, scalable campus networks
- Advocacy

# The digital campus infrastructure upgrade/renewal

USD 5 - 10 million per university campus

Includes adequate campus WiFi coverage

Stable and clean power key problem



# Options for financing gaps in digital campus infrastructure and digital skills

- **Private partnership funding** with supplier credit - Keynote speech by Prof Kinandu Muragu
  - Private sector donations – e.g., 2022 Google connectivity project for TVETs and hospitals (\$5 million)
  - KENET supplier financing arrangements or infrastructure grants (e.g., BOLT grant of \$200,000)
- **Kenya Digital Economy Acceleration Project** by Dr. Tim Kelly, World Bank
  - EU / German Development Bank / French Development funding TVETs connectivity and digitization
  - Covert to a **sustainability fund** similar to KTCIP in 2007?
- Hybrid of the two options ?

# Does KENET membership still matter?

# Thank You

[www.kenet.or.ke](http://www.kenet.or.ke)

Jomo Kenyatta Memorial  
Library, University of Nairobi  
P. O Box 30244-00100, Nairobi.  
0732 150 500 / 0703 044 500