

Case study: Sengerema Telecenter Shared Mesh Network

**On behalf of the Sengerema team:
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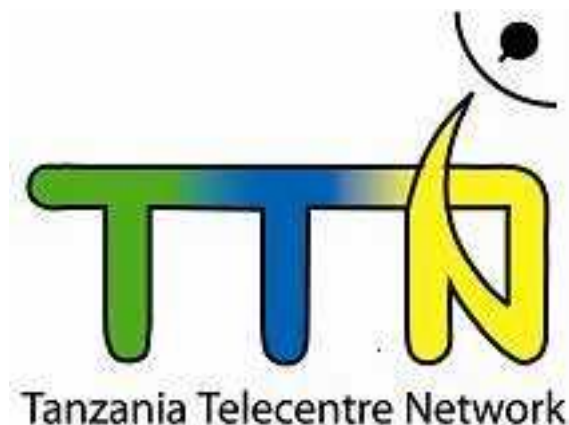


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Mesh cases

Sengerema, Tanzania

- Sengerema Telecenter
- Part of Tanzania Telecenter Network (TTN)
- First shared mesh network in Tanzania
- Supported by IICD (Netherlands)



Sengerema Mesh Background

- Sengerema multi-purpose Telecenter: computer services, printing, office, internet, education, FM Radio Station (reach 400,000 people) etc
- Has internet connection - VSAT 128/64 kbps through COSTECH (Tanzania Commission for Science and Technology) - newskies.com as VSAT provider

Sengerema Telecenter



Sengerema Telecenter: Tower



Sengerema Mesh

Remarkable aspects

- New business models aiming at sustainability independent of funding
- Network creation embedded in capacity building and community growing
- Addressing the “chicken - egg” problem of creating a rural IT environment
- Lakezone Wireless Expert Group

Sengerema Mesh

Customers



Sengerema Mesh

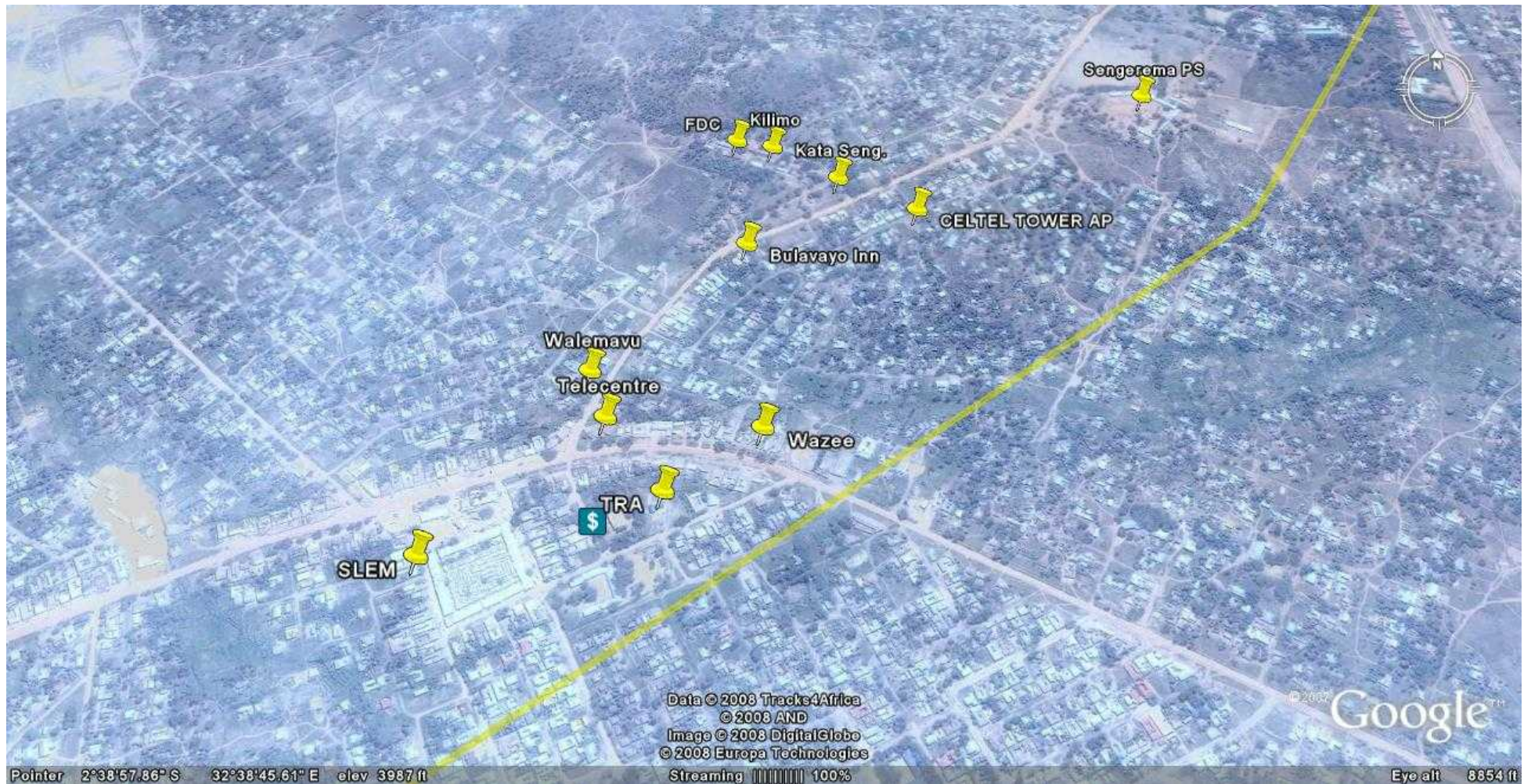
Customers / Users

- **First round:**
- The Union of Disabled Association of Tanzania
- Sengerema Non-Governmental Network-SENGONET
- Sengerema Focal Development College (FDC)
- District Educational Office / DEO
- Sengerema Agricultural Office
- Tanzania Chamber of Commerce, Industries and Commerce (TCCIA)
- UNDP/SLEM Entrepreneurs office
- Teachers Resource Centre (TRC)
- Tanzania Teachers Association (TTA)
- Home of the Elderly
- KIMOSA enterprises
- Ward
- **Upcoming:**
- Primary School
- Hotel Lisbon
- And many more ...

Celtel Mobile Operator Tower



Sengerema Mesh Map



Sengerema Mesh Workshop October 2008



Sengerema Mesh

Technology choices

- Low budget (...) Mesh
- Wireless routers: Linksys WRT54GL
- Firmware: OpenWRT/Freifunk
- Antennas: self built (with some exceptions)
- Antenna masts built locally

Sengerema Mesh: Budget WiFi vs. Motorola Canopy

• Comparison	Canopy	Wifi
Initial costs per customer [USD]	1200	150-200
Speed	54 Mbps	54 Mbps
(With a VSAT connection of 128/64 kbps, the speed of the local wireless net will not be the bottleneck, in the foreseeable future)		
Life span, expected	10 years	5 years
Loss rate	?	25% per year
Hardware failure, Theft, Power fluctuations, Animals, Water/climate		

Mesh cases

**Sengerema:
Node
hardware**



Sengerema Mesh Node hardware



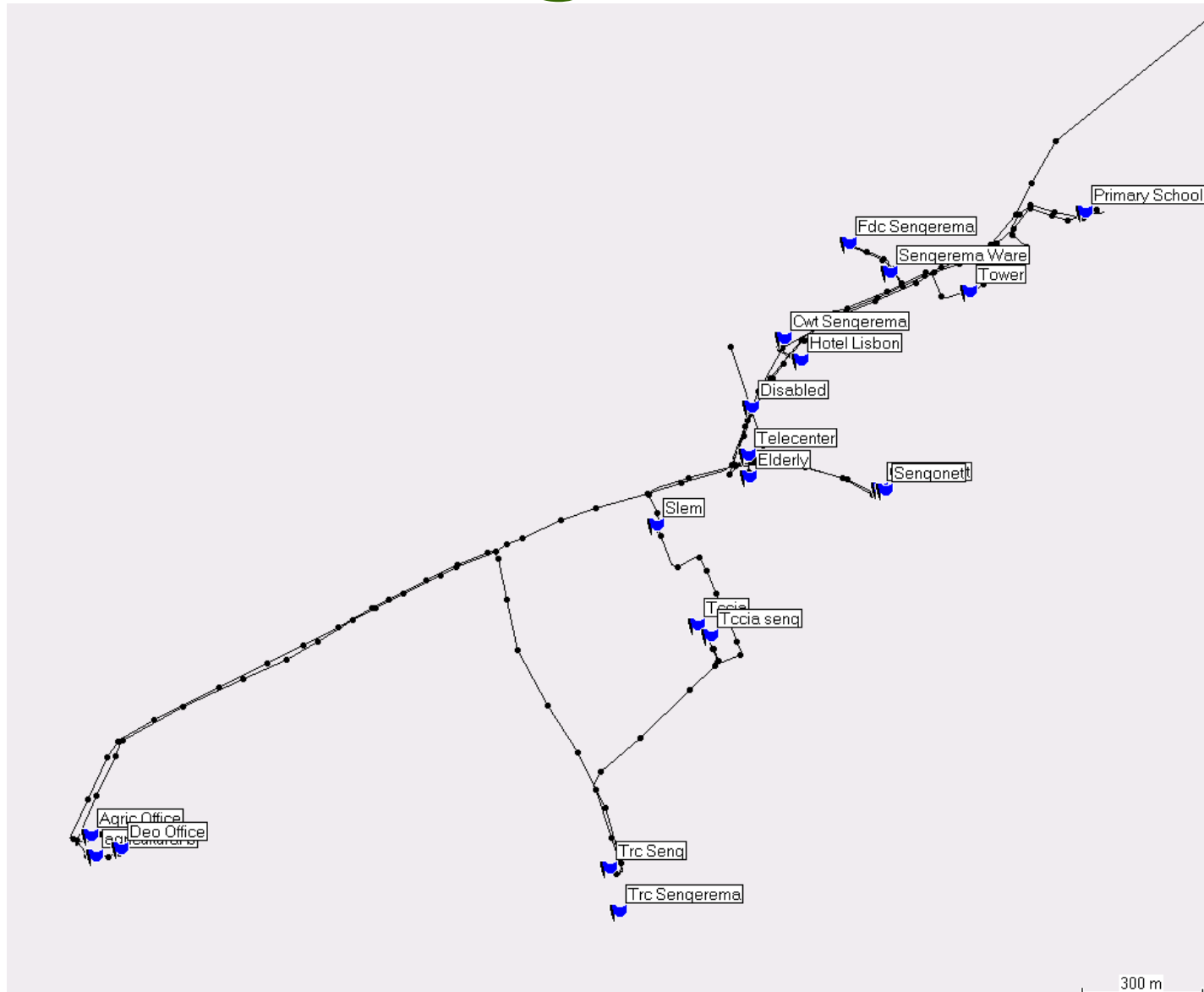
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**Super node:
Omni &
Biquad
Antenna**



Sengerema Mesh

GPS recording of sites



Site Survey:

**GPS,
environment,
technical &
human
factors**

Primary School

Coordinates

S238 40.5 E32 39 04.7

IP number

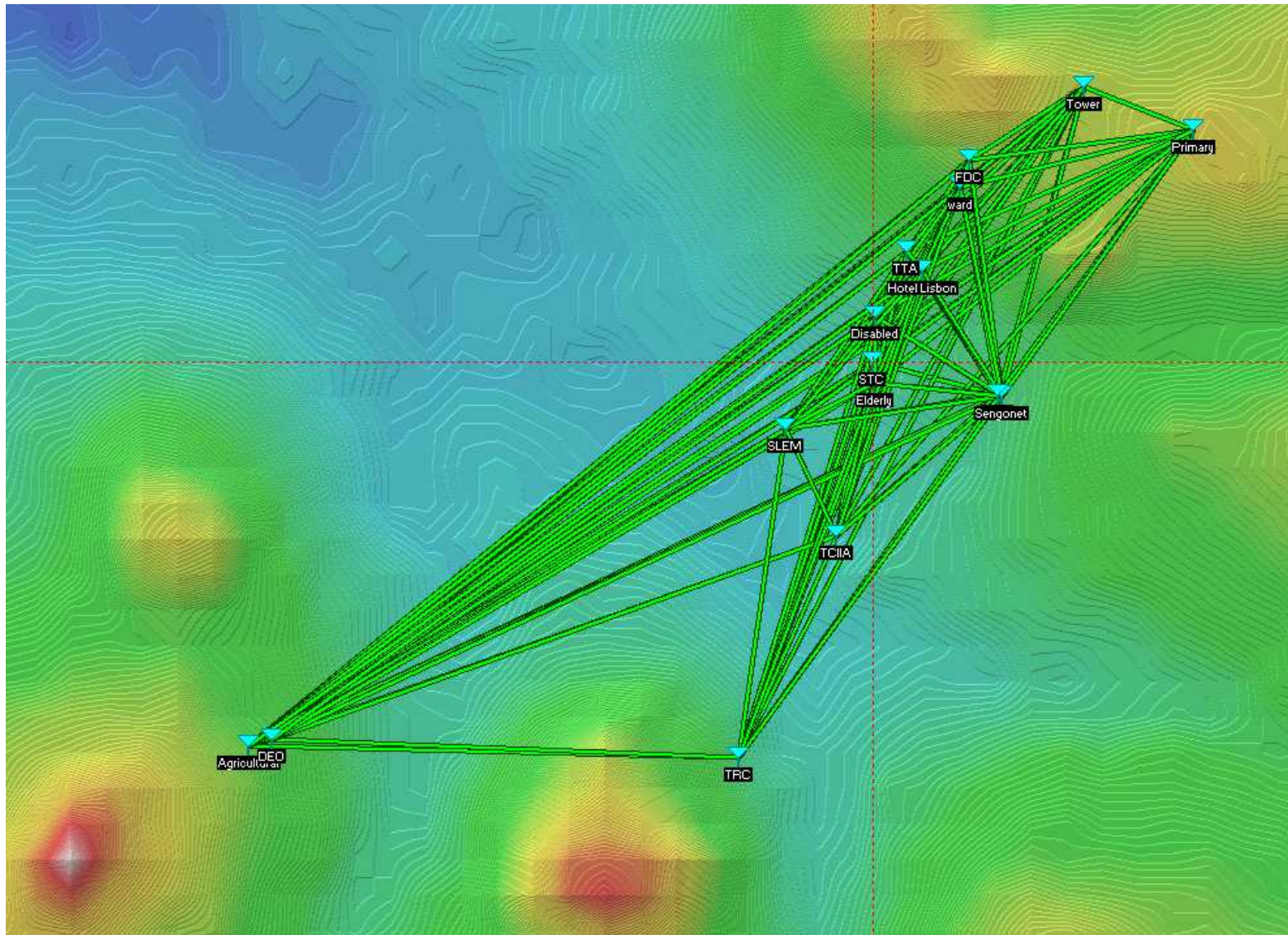
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Comments & Pictures

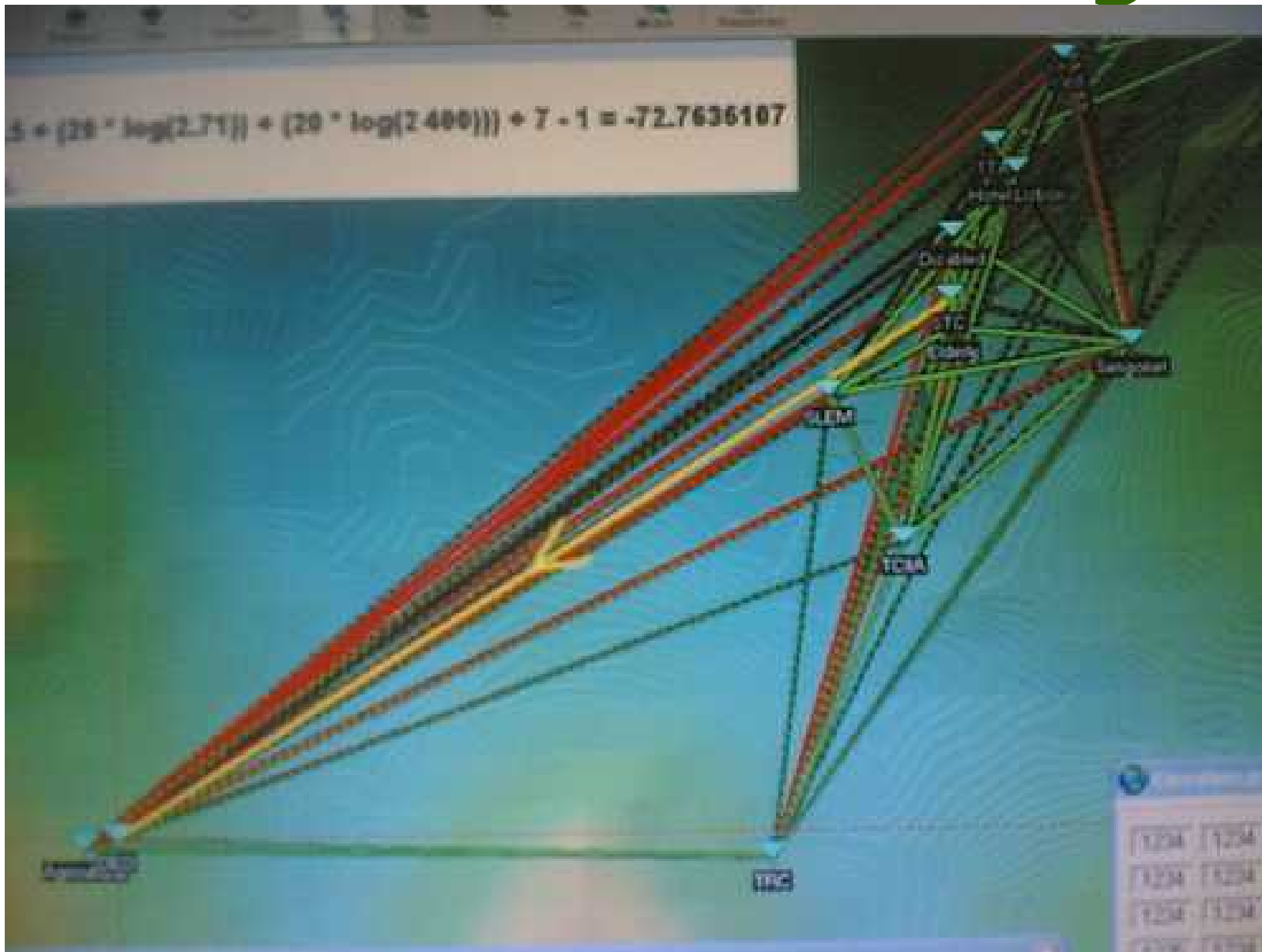


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Radio Mobile Planning

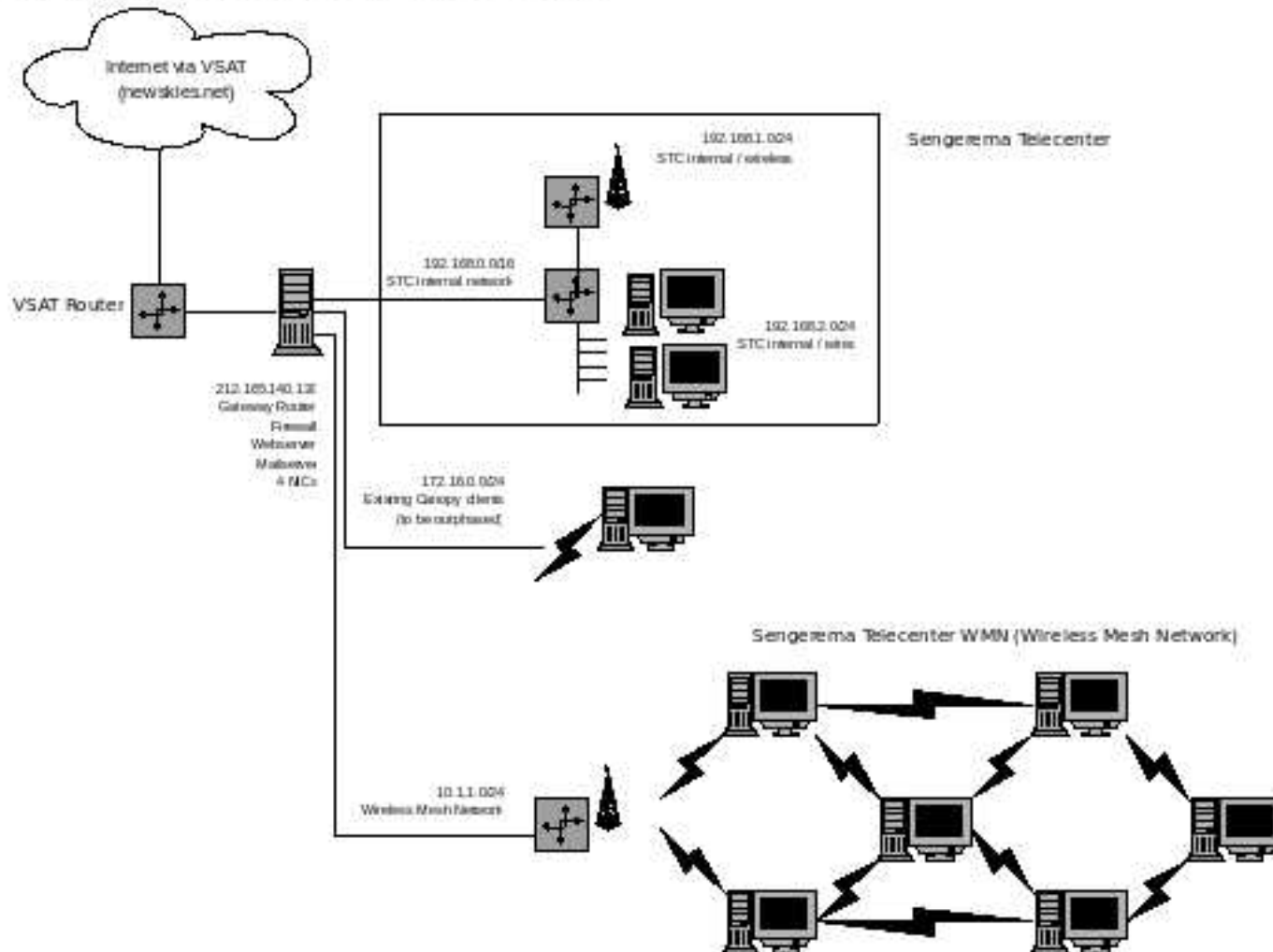


Sengerema Mesh RadioMobile Planning



Sengerema Mesh Network Plan

Sengerema Telecenter Network



Mesh cases

**Sengerema:
Installation**



Sengerema Mesh

Antenna Masts

- 6 poles L- shape each six metres
- 5 poles normal each six metres

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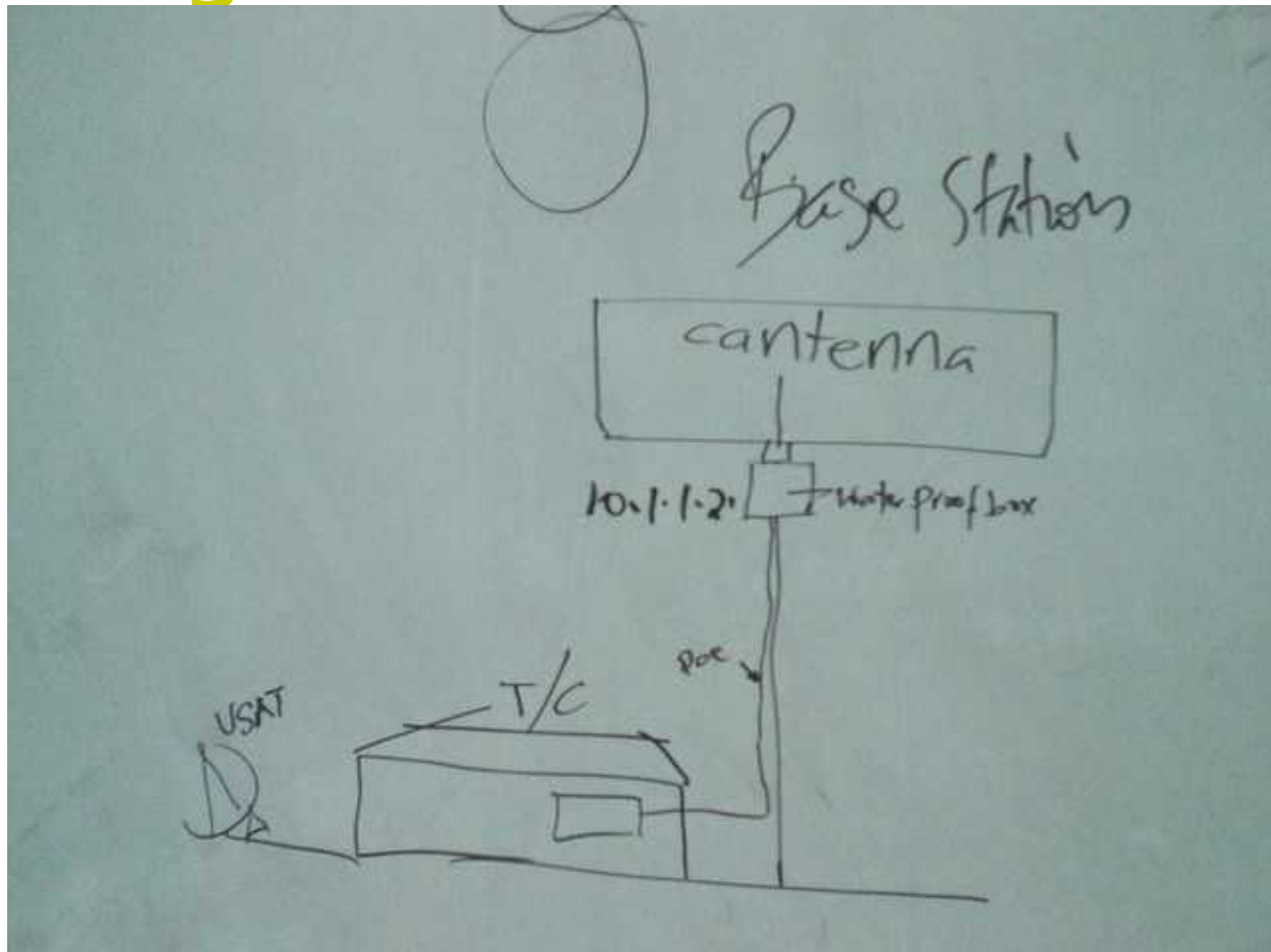
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Opening ceremony



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Challenges & Next Steps

- 10+ sites (e.g. a school with hundreds of students) getting to use the web via 128/64 kbps ... bandwidth becomes an issue
- Complete Proxy / Cache configurations
- Create Local Content
- Configure Bandwidth Management

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Challenges & Next Steps

- Connect the next customers waiting
- Upgrade the VSAT bandwidth

Sengerema Mesh

Challenges & Next Steps

- Usage problems: Lismas, the technician, reports:
“A customer told me there is a problem with the internet. When I checked it, I found out he typed only two w’s instead of three to enter the World Wide Web”.
- Virus protection
- Tools and techniques

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Further Info

- <http://telecentre.org>
- <http://iicd.org>
- Many blogs and articles from Sengerema:
 - <http://www.iicd.org/IICDCorporateBlog/sengerema-community-browsing-the>
 - <http://www.telecentre.org/profiles/blogs/people-with-disabilities-hails>
 - <http://www.telecentre.org/profiles/blog/list?user=366s7pcdpwq42>
 - <http://www.iicd.org/articles/launch-of-wireless-internet-in-sengerema-tanza>
- Flickr.com: search for “sengerema wireless mesh ...” :)
e.g. John Kibuuka's stream: <http://flickr.com/photos/kjohnah/>