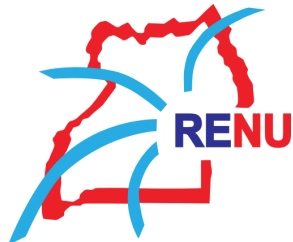


Bridging the Connectivity Gap Using Unconventional Last-Mile Solutions

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Overview

26th October 2023

Outline

- Background
- Connectivity Gap
- Objectives
- Implementation
- Sites Connected
- Network Performance
- Conclusion
- Q&A

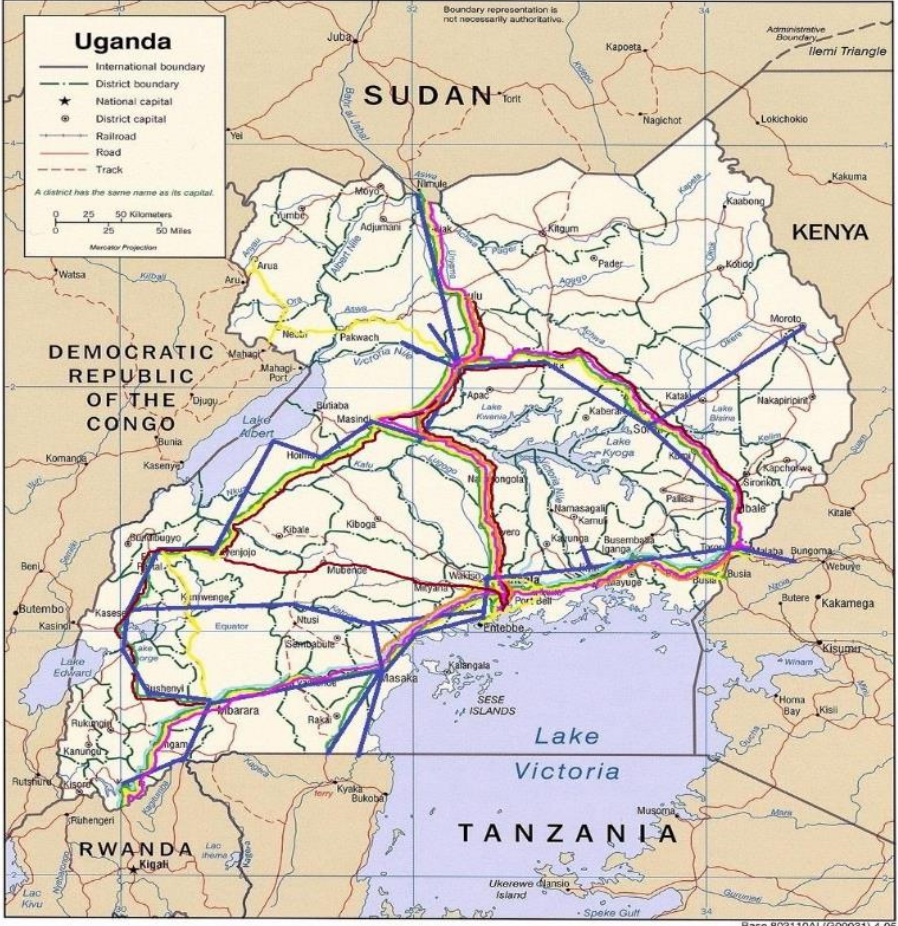
Background

- Connectivity: Vital for Research and Education
 - Enables access, collaboration, innovation, and equal opportunities
- Underserved communities
 - 144 Health Centers (RHSP)
 - Research to tackle HIV prevalence
 - Connectivity required for patient care, and collaboration
 - Tackling SDGs 3 & 4



Connectivity Gap

- Optical fiber coverage (national) – Backhaul
- Map showing OFC coverage by key infrastructure players



Connectivity Gap

- 4G Population Coverage – estimated at 80%
- Satellite Connectivity - High-Latency (200ms +)

- Low Earth Orbit?



- 20% of the population including R&E requires innovative solutions for fairly low-latency connectivity!



How does this gap reflect in the communities?



- Gap in research in health, agriculture, and education leads to a decline in well-being and livelihood.

Objectives

- Fairly low latency (up to 50ms to RENU backbone)
- Bandwidth – Sufficient for the use cases
- Costs (Installation & Maintenance) – Affordable to the communities



Microwave Point-to-Point links?

- Line-of-sight (LoS)
- Deployed in rural areas with gentle terrain
- What about areas with rugged terrain with no line-of-sight to the nearest towers?



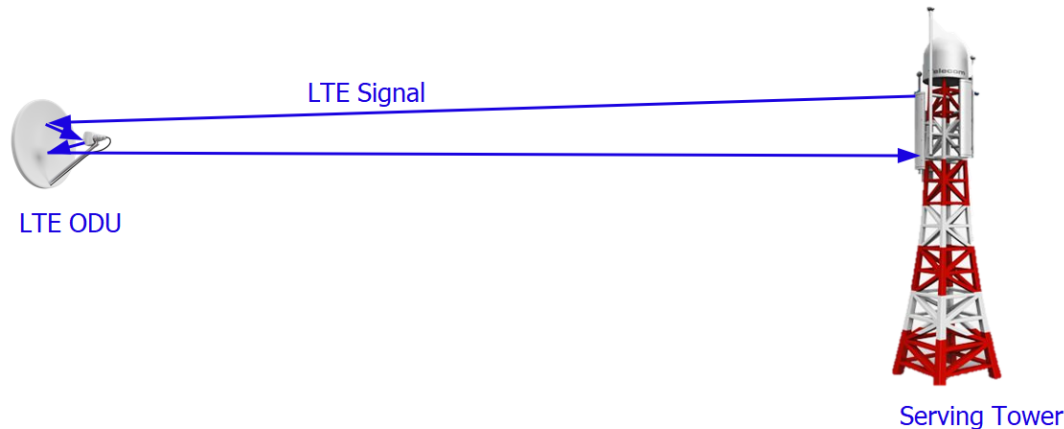
Implementation

- Leveraging the 80% 4G coverage
- Enhancing LTE signal reception
- Antenna gain of more than 30 dBi
- Parabolic reflector antenna used to enhance gain
- LTE device compatible with Satellite TV offset dish

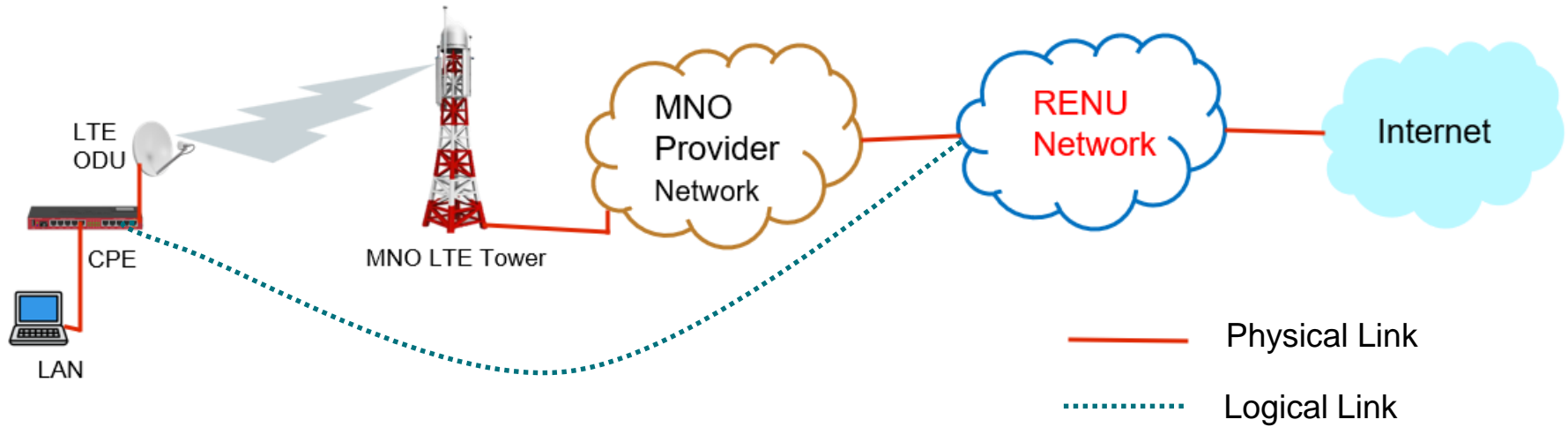


Implementation

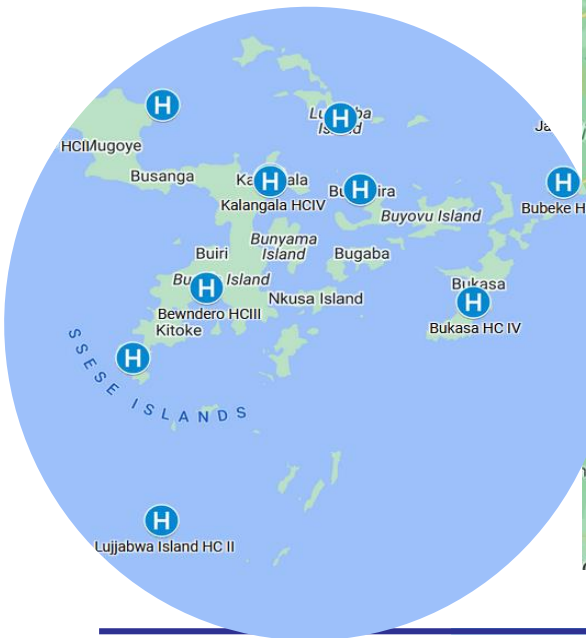
- Satellite TV Offset Dish
 - Reflector antenna – Directional (Oriented to face tower)
 - Concentrates incoming signal on LTE ODU
 - Focuses outgoing signal to serving tower in a beam



LTE Network Setup



Sites Connected – 12 Island Health Centers



Installation Pictorial




Our Teams




Network Performance

- LTE Signal Strength

Antenna Gain of 30 dBi

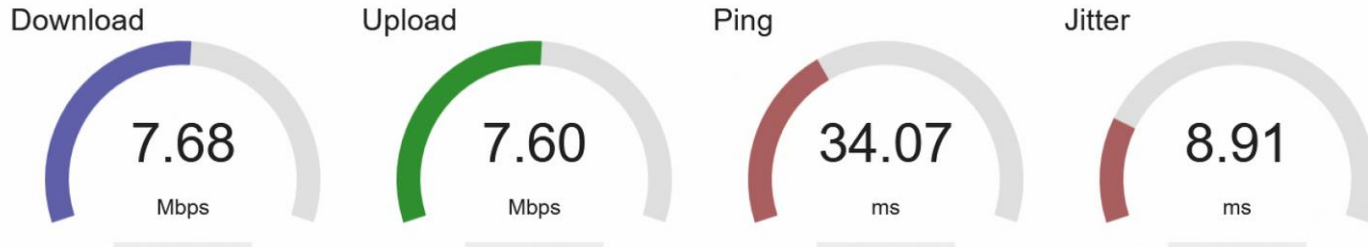
Access Technology:	Evolved 3G (LTE)
IMEI:	356662101768411
IMSI:	641101934369914
UICC:	8925610001476595889
Primary Band:	B3@15Mhz earfcn: 1848 phy-cellid: 503
CA Band:	
Session Uptime:	00:02:07
RSSI:	-68 dBm
RSRP:	-98 dBm
RSRQ:	-9.5 dB
 SINR:	10 dB
CQI:	12

Antenna Gain of 21 dBi

Access Technology:	Evolved 3G (LTE)
IMEI:	355654095092420
IMSI:	641101928427580
UICC:	8925610001417172541f
EARFCN:	1848 (band 3, bandwidth 15Mhz)
Session Uptime:	04:06:11
RSRP:	-105 dBm
RSRQ:	-13.0 dB
 SINR:	2 dB
CQI:	8

Network Performance

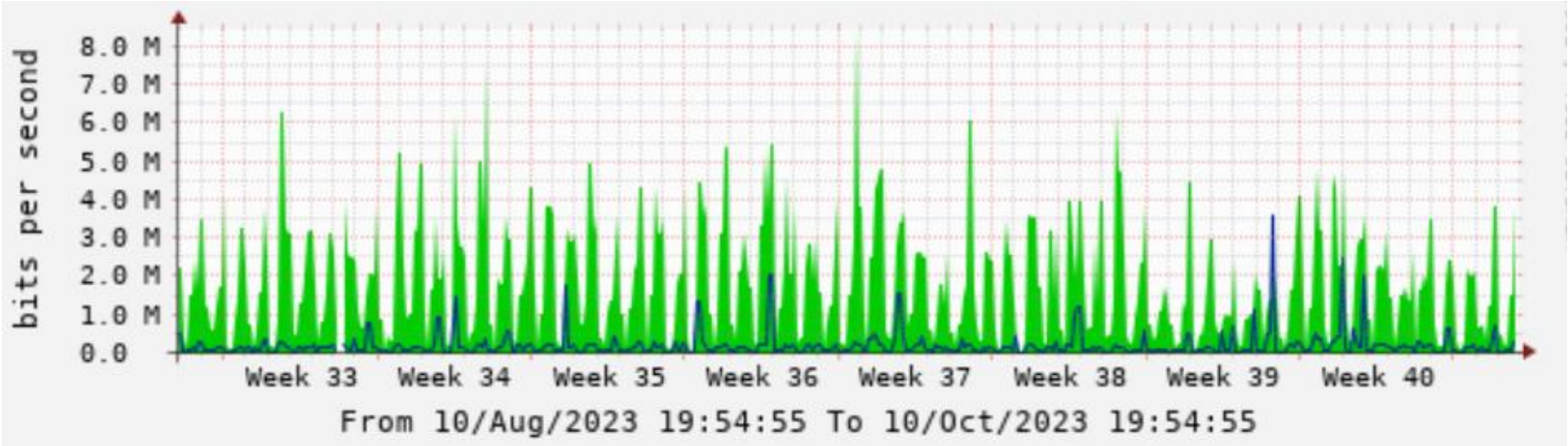
- Tests from one of the Health Centers – Subscribed BW 8 Mbps



Your Internet speed is

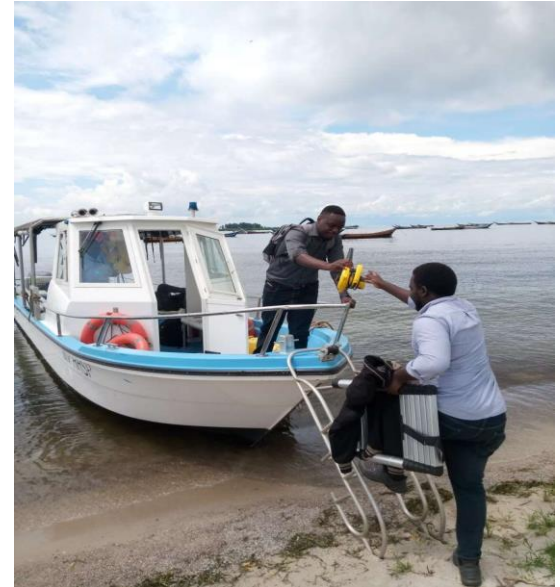
7.3 Mbps 

Utilisation



Challenges Overcome

- Frequent downtime as a result of LTE session hanging
 - Required physical LTE ODU restart
 - Overcome by running a script to check the LTE interface and restart in the event of a session hang



What the researchers say

“

Remote health centers now have seamless Internet-based communication with the Ministry of Health, Regional Referral Centers, District Health Offices, and regional health authorities. This has enhanced remote implementation, training, mentoring, and monitoring of health systems and services.

”

Joseph Mutaasa
RHSP Regional ICT Supervisor

Q&A

The End