Internet Society | Beyond the Net

Progress Report on

Piloting the use of TV White Space for Community Networks in Rural Tanzania project

ISOC Tanzania Chapter

Progress Report

3rd September, 2018

1. Project information

- **Project leader:** Jabhera Matogoro, jaberamatogoro@gmail.com

- **Team members:**

1. Mr. Jabhera Matogoro, Project Manager, Masters in Computer Science from University of Dodoma and Bachelor in Computer Science from University of Dar es Salaam, jaberamatogoro@udom.ac.tz, Interim Secretary and Active Member of the Chapter with Membership ID: 56956. He has participated in deployment of TV White Space Network and Mesh Wireless Network in Kondoa Community Network and delivers wireless training to people involved in providing technical support.
2. Prof. Justinian Anatory, Full Professor in Telecommunication Engineering, Dean School of Informatics - University of Dodoma, Tanzania. He has participated in Radio Frequency Planning and Implementation of TV White Space Network as well as play advisory role.
3. Prof. Nerey Mvungi, Full Professor in Electrical Engineering, University of Dar es Salaam, Tanzania. He has participated in Radio Frequency Planning and Implementation of TV White Space Network as well as play advisory role.
4. Prof. Ermanno Pietrosemoli, Senior Project Researcher, ICTP, Italy. He has provided technical support remotely in planning and deployment of TV White Space Network and Mesh Wireless Network.
5. Dr. Marco Zennaro, Senior Project Researcher, ICTP, Italy. He has provided technical support remotely in planning and deployment of TV White Space Network and Mesh Wireless Network.

6. Eng. Abibu Ntahigiye, ISOC Tanzania Chapter Member and Chapter Chairman - Membership ID: 99921. He is a Project adviser and will participate in conducting sensitization and awareness workshop for Kondoa Community Network Members.
7. Mr. Nazarius Kirama, ISOC Tanzania Chapter Member and Chapter Secretary - Membership ID: 85571. He is a Project adviser and participating in conducting sensitization and awareness workshop for Kondoa Community Network Members.
8. Ms. Rebecca Ryakitimbo, Active Member - ISOC Tanzania Chapter, Membership ID: 139048. She works with TechChix in Tanzania and played a role to encourage women and girls in Science, Technology, Engineering and Mathematics (STEM) field so that both women and girls impacted by this project can take advantage of established community network.

- **Partner organizations:** The University of Dodoma

- **Total amount awarded:** USD 30,000

- **Period covered by this report:** February – August, 2018

9. Project Summary

Tanzania has experienced an exponential increase in the number of voice telephone and Internet users in the last few years. The number of voice telephone subscription increased from 6.3 Millions in 2007 to 40.4 million in March, 2018; while the number of Internet users increased from 3.6 million in

2008 to 23.0 million in 2017; (Tanzania Communications Regulatory Authority [TCRA], 2007; TCRA, 2014; TCRA, 2018). Almost half of Tanzania population remains unconnected to benefit from the current digital economy with the current traditional Internet access approaches. A study that was carried out by Research for ICT Africa (RIA) in Tanzania reported that 86% of rural dwellers remain unconnected to the Internet services (RIA, 2017). RIA further reported that when comparing Internet access in term of gender then fewer women than men have access and use of Internet in Tanzania.

This project has been designed to build a pilot using TV White Space equipment as a community network solution to bridge the identified Internet access gap between rural and urban areas. This project has connected three educational institutions in Kondoa District, namely; Kondoa Girls High School, Bustani Teachers College and Ula Secondary School. The maximum bandwidth capacity that has been achieved is 4.70 Mbps for download and 4.75 Mbps for upload. This is a remarkable speed for rural dwellers. Thanks to Internet Society and The University of Dodoma for making this possible.

Figure 1: Climbing a two floor Building to Install a Receiving antenna

Figure 2: Installation of Customer Premise Equipment at Bustani Teacher's College in Kondoa

10. Project Background and Justification

In the past two years, one would take almost 6 to 8 hours travelling from Dodoma City centre to Kondoa District located about 140 km from Dodoma. This was partly due to poor road infrastructure connecting these two locations. Poor road infrastructure has also contributed to the current digital divide in Kondoa. It should be acknowledged that early this year (around March, 2018) a modern road infrastructure was inaugurated connecting Kondoa and Dodoma city making 2 hours drive between these two locations possible. Kondoa District hosts a historical site known as Kondoa Irangi Rock Paintings, a series of ancient paintings on rock shelter walls in central Tanzania. Some of the paintings are believed by the Tanzania Antiquities Department to date back more than 50,000 years[1].

Despite all of those potentials in Kondoa, still it has been left behind in term of Internet connectivity and this project is towards connecting the unconnected secondary school in Kondoa District through community owned network broadly known as Community Network. Kondoa Community Network (KCN) is the first CN to be established in rural Tanzania harnessing unused ultra-high frequency (UHF) band to address the issue of Internet access gap in Tanzania. KCN has brought together various stakeholders in Kondoa to discuss, design, operate and support the installed network. These stakeholders form KCN

[1] https://en.wikipedia.org/wiki/Kondoa_Irangi_Rock_Paintings

steering committee and will decide on cost structure of Internet access and later work on the sustainability model for KCN.

11. Project Objectives

The general objective of this project is to pilot the use of TV White Space as a feasible solution for Community Network in Rural Tanzania. Specifically, the project intends to achieve the following objectives:

i. Perform radio frequency planning and link budget calculation.
ii. Design, implement and analyze the TV White Space technology for community network.
iii. Conduct three training in wireless technology to assure the sustainability of the project over time.
iv. Assess the impact of community network in achieving inclusive and equitable quality education and standard of living.
v. Assess the impact of community network in empowering women and girls.

12. Project Activities Completed so far

Table 1 shows the list of activities undertaken by the project team and their completion status for each activity.

S/N	Project Objective	Completion Status	Remarks
1	Perform radio frequency planning and link budget calculation.	Completed	BotRF tool was used
2	Design, implement and analyze the TV	100%	Four educational

	White Space technology for community network.		institutions have been connected to high speed Internet connection (4 Mbps)
3	Conduct three training in wireless technology to assure the sustainability of the project over time	75%	Two training has been conducted
4	Assess the impact of community network in achieving inclusive and equitable quality education and standard of living	60%	Baseline survey has been developed
5	Assess the impact of community network in empowering women and girls	60%	Kondoa Widows Women Group and Girls in Kondoa have been engaged

13. Project outcomes

The following project main outcomes have been achieved so far.

i. Technical training has been delivered to five (5) participants in Kondoa Community Network. Learn by doing approach has been applied to equip the required technical skills in installation and management of TV White Space Network in Kondoa.

ii. Sensitization and awareness workshops have been delivered to Kondoa Community Network steering committee and other Internet users in Kondoa. A total of 123 members have been trained on issues related to community network, internet governance and role of the chapter in making Internet available to everyone in the project area.

iii. Internet access has been made available in four educational institutions i.e Kondoa Girls High School (Public) - 3.02 Mbps (download) and 1.11 Mbps (upload); Ula Secondary School (Public) - 2.91 Mbps (download)

and 1.59 Mbps (upload); Study Zone Computer Centre (Private) - 2.51 Mbps (download) and 4.71 Mbps (upload) and Bustani Teacher's College (Public) - 5.03 Mbps (download) and 4.90 Mbps (upload)

iv. Three presentations have been delivered to Arusha Women School of Internet Governance, Tanzania School of Internet Governance and Tanzania National IGF.

v. One presentation has been delivered to Government ICT Steering Committee

vi. One media coverage has been published: http://www.thecitizen.co.tz/News/1840340-4537620-27fpvcz/index.html

vii. One presentation will be delivered to Community Network Summit in Africa to be held in South Africa.

14. Any changes in the design of the project

The project has not experienced any project change and the team is committed to deliver the stated objectives as per project schedule shared in the project proposal.

15. Dissemination and Chapter presence

This project has been delivered in various workshop and events as mentioned in project outcome section.

16. Project photos

Figure 3 and Figure 4 shows the RuralConnect Gen3 Base station and 2-Bay sector antenna from Carlson Wireless that delivers the connectivity to three

education institutions in Kondoa District. Prof. Justinian Anatory visited Kondoa District and participated in sensitization and awareness campaign aiming to bring together various stakeholders in Kondoa to own the process.

Figure 3: Base station installed at 30 Meters Above Ground Level

Figure 4: 2-Bay Sector Antenna Transmitting Signal from the Base station

Figure 5: Prof. J. Anatory in a Group Photo with Kondoa Community Network Steering Committee