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Final report on Wireless Mesh Network Project Deployment in Faculty of Communication and Information Sciences, University of Ilorin, Ilorin, Kwara State, Nigeria

By

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August, 2013

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Project factsheet information

Project title	Wireless Mesh Network for Campus Radio, eLearning & Communication in a Tertiary Institution
Grant recipient	Nasir Faruk Department of Telecommunication Science Faculty of Communication and Information Sciences University of Ilorin, P.M.B 1515, Ilorin, Kwara State, Nigeria. www.unilorin.edu.ng
Dates covered by this report	01 – 05 – 2013 / 30 – 11 – 2013
Report submission date	30 – 11 – 2013
Country where project was implemented	Nigeria
Project leader name	Nasir Faruk
Team members (list)	Olayiwola Wasiu Bello email: laibello@yahoo.com Dr. Michael Adeyeye email: micadeyeye@ngportal.com Thomas Gone: gonethomas@gmail.com
Partner organizations	University of Ilorin, Nigeria and Cape Peninsula University of Technology, South Africa.
Total budget approved	$ 10,000

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Project Summary

W e present this final report to account for the Fund for internet Research and Education given to our group to sponsor our project. We further acknowledged that we received the funds in the total of 8,500 US Dollars and we have since then implemented the activities of our project as proposed in the application that we submitted to AFRINIC. The report narrates what we have done, how we have used the funds, how activities have been carried out, what we have achieved ; and the challenges encountered .

The funds that we received have been spent to do the project. Details of the expenditure including actual figures are listed in the financial report.

The report has been compiled by the team involved in the implementation of the activities of the project. The team has evaluated every aspect of this project and measured everything against the project goals . The report gives a comprehensive analysis of the impact the project had on the beneficiaries and on the community where it is being implemented. It also gives recommendations for the sustainability of the project. All parties including beneficiaries and instructors have contributed to this report since they have been practically engaged in the activity.

The project was aimed at providing a veritable platform for communication and Internet access towards enhancing academic activities both administrative, technical, direct teaching and eLearning. It is also hoped that the project will serve as a research test bed for students both at the undergraduate and post -graduate levels as well as lectures and technologists in the University and possibly surrounding institutions.

Workshop was organized where 60 participants from academics and Industry were exposed to the WMN (Wireless Mesh Networks) technologies and recent trends - co-operative & decentralized WMN. Emphasis on local media was taught and how WMNs could be used for campus radio & communication. Extra training was offered on how the WMN could be integrated on the existing internet infrastructure to provide internet service**.**

Wireless Mesh Network Technologies (Wireless Mesh Potatoes) were deployed in offices of Head of Departments and the Dean within the faculty of Communication and Information Sciences, University of Ilorin Nigeria. Alternative power supply units were also deployed at the nodes.

The network is made up of Mesh Potatoes (MP). Each MP features a wireless transceiver, telephone and RJ45 interfaces as well as industry standard PBX controllers in a robust simple weatherproof package. The telephone interface provides voice (telephony) services with the use of traditional analog telephone boxes, while the RJ45 interface provides connection to the

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corporate local area network (LAN) for data and computer based services. The wireless interface provides support for WiFi enabled devices such as laptop computers, tablets and mid-to-high end mobile phones. Multiple MPs are setup to form a resilient mesh network which acts as a de-centralized communication highway with 99.9% availability.

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Background and Justification

Since the expansion of the internet in the early 1990s, it has become customary for individuals to turn to the global information infrastructure whenever the need information and facts. The internet is an unsuppressed repository of information and means of communication of all kinds. The history of internet expansion favours its serving mainly academic purposes of increasing the ease of knowledge dissemination. The infusion of the internet into higher education has intensified across to archived information sources from various part of the world, thus it form a first part of call for researchers, students and others when they seeks for information. As results, institutions in Nigeria are investing much to exploit the advantages of the information infrastructure for the benefit of their staff and students. Studies have been carried out to understand how students and staff of Nigeria universities and colleges of higher learning utilise the internet for teaching, learning and other purposes such as communication amongst which involves both voice and data. It has been found that majority of the usage in terms of communications are mainly text in the form of email chart. These are as the results of the inability for the network infrastructure to support variety of multimedia services such as the Voice over Internet Protocol (VOIP) for the staff and students to utilise some sorts of applications like Skype to enable communications amongst the researchers, faculty, departments and other sections of the institution. This project aims to provide alternative, reliable and easy means of communication for staff and students of University of Ilorin. By exploiting the benefits for deploying wireless mesh networks. At the end of the project, local and free means of communication in the campus would be provided also, the team will provide training for students, local technicians and staff members (anticipated up to 60 people) in aspects of the setup, installation and maintenance of the SECN (Small enterprise community network). A few of the trainees will receive more advanced training and actual employment.

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Project objectives

This project aims to provide alternative, reliable and easy means of communication for staff and students by exploiting the benefits for deploying wireless mesh networks. The main objective is to provide relevant training and skills and acquisition in the services, and applications for wireless mesh and ad hoc networks particularly as used for location services (wireless sensor networks), campus radio, eLearning, knowledge transfer and communication among staff and the likes.

The project is related to an on-going implementation of a simple communication application designed by Ernesto Gomez Tagle G (Violetta Platar) and Abdel Wahid Sabre Ousman (Ben Sabre Fils) in South Africa, which based on an Asterisk script, enables users to make calls from mesh potatoes to PSTN or GSM peers, using a VoIP based architecture.

Presentation were made on the application at FoSHS '13 and can be found at http://bit.ly/17ToD6m and http://bit.ly/1aUd8g0. Feedback from students on FoSHS is available at http://bit.ly/1aUdkvR. And some pictures of the presentation can be found below.

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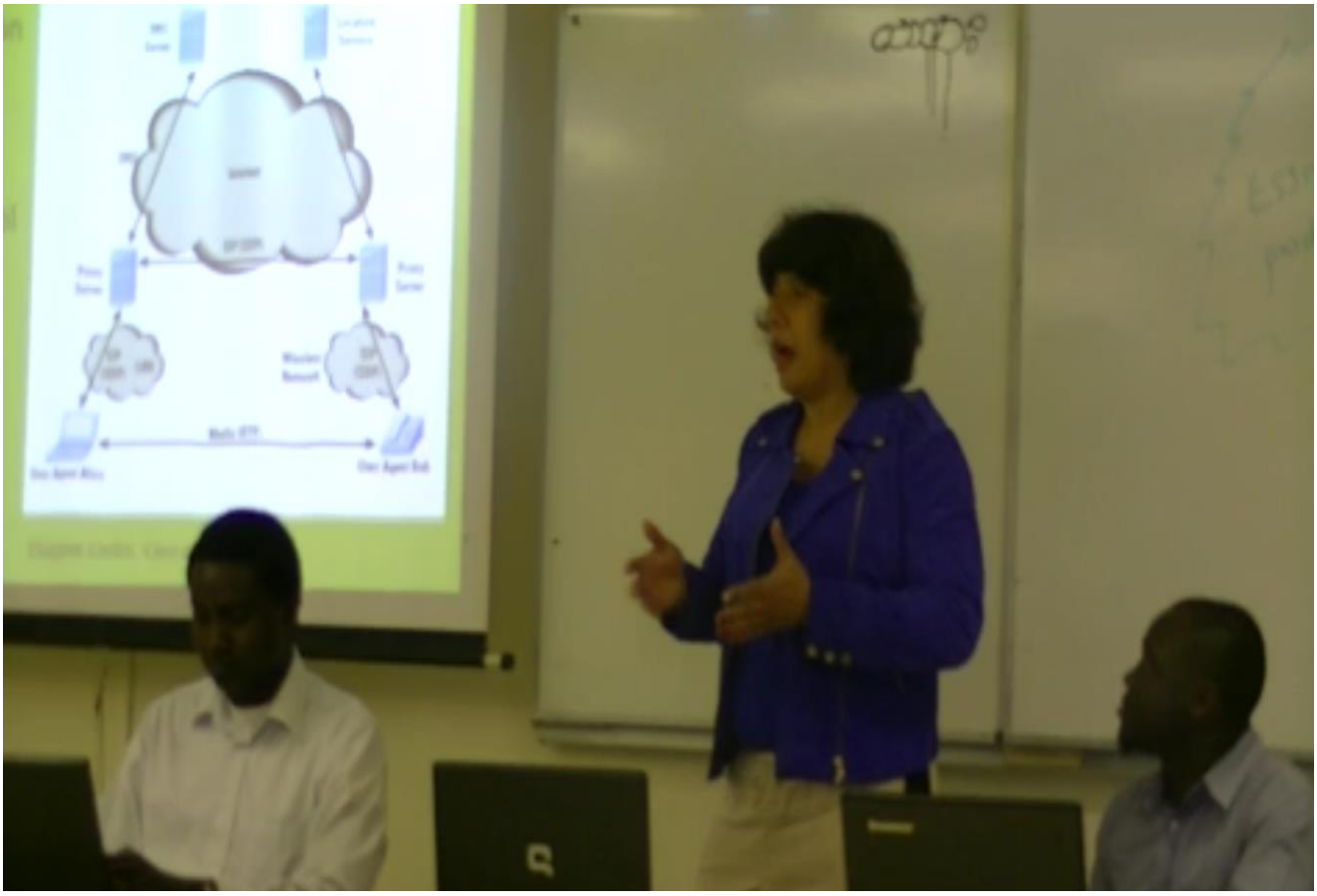

This is especially true in the case of the Firefox OS phone, which may be analysed as an alternative for hosting a client receiving calls from the mesh potato users. This would eliminate the excessive dependence of smartphones for actual application deployment.

Our intention is to continue working on our project, with further tasks possibly relating to planning a fully mesh communication network based on extensive use of Session Initiation Protocol (SIP) clients (e.g. Elastix or Trixbox) and closely following any new developments of the Firefox OS / Firefox phone as we presume this will be dominant technologies in the future.

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Users and uses

The users of the WMN encompass the staff in the faculty of Communication and Information Science University of Ilorin, Nigeria. The students of the faculty are also direct beneficiaries of the project. With the successful deployment of the WMN, the outcome of the project could be extrapolated to the entire university. Similar project could also be initiated in other universities where we had participants from. With the participation of some professionals from the industry, there is the possibility of transferring the knowledge gained to the commercial domain.

From the relevance perspective, the extent to which the project will provide the following will be evaluated:

- Highly scalable and reliable voice and data services.

- Cost-effective approach to support high-speed last mile connectivity and ubiquitous broadband access

-Internet accessibility at the end of the project

-Measure of local communication

-Reliability of the established network.

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Indicators

Baseline	Indicators	Progress	Assessment	Course of action
-Before the project, communication within the faculty from department-department has always been through the use of mobile cellular phones and in some situations they have to walk to the offices. The knowledge of WMN was also very low -Implications: Recurrent cost for recharging the mobile -Time wasted during movement from one point to another -Delay in message delivery -Most participants claimed to be hearing about WMN concept for the first time . this we got through the pre-workshop questionnaire.	- relevant training and skills (100%) -eLearning, (50%) -knowledge transfer (70%) -communication among staff. (100%) Deployment (80%)	-At the conclusion of the 2-day workshop, not only do the participants understand the basic concept of WMN they were also equipped with hands on knowledge on its deployment - Communication within the faculty from department to department is majorly carried out through the WMN -the experience gained in the workshop has successfully ensured the acquisition of necessary knowledge base to start up WMN deployment The WMN has been deployed and functional	.	-Evaluation of the deployed network in areas like: Reliability (down time/up-time) Equipment Failure Coverage expansion (deploying additional nodes) Continuous signal strength monitoring using agilent spectrum analyzer (100Mhz-7 GHz) -interference analysis for peaceful coexistence between the adhoc nodes -Evaluation of number of call rate -Carrying out follow up activities on workshop participants to determine activities being carried out with respect to the knowledge gained during the workshop

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Project implementation: understanding the chain that leads to results

PHASE I

2-DAY WORKSHOP ON WIRELESS MESH NETWORK PROJECT FOR CAMPUS RADIO, eLEARNING, COMMUNICATION AND KNOWLEDGE TRANSFER ACROSS AFRICA

To realize the objectives of the project researchers in relevant areas were co-opted into the activities. Of very high importance is the contribution of Dr. Michael Adeyeye and Mr. Thomas Gone of Cape Peninsula University of Technology, Centre for Research and Development in Open Technology and Asmic Computers, South Africa. They assisted technically during the set-up of the network and assisted in purchases of some of the equipment used. Thomas Gone, with some academics in the faculty, presented various topics on Wireless Mesh Networks. Below are some important topics discussed during the workshop sessions.

Design of wireless mesh networks

a) Over view of wireless communication
b) Overview of WMN structure, client infrastructure
c) Overview of Mesh routing protocols
d) Scalability Recovery
e) Addressing, routing and domain name resolution
f) Interference with external networks (single homed and multi home WMNs)

1. WMNs for internet access
   - ♋◑ Design
   - ♌◑ Authentication, Authorization and accounting
   - ♍◑ WMN visualization and monitoring
   - ♎◑ WMN security
2. Demonstration
   - α) Introduction to OpenWRT/embedded linux
   - β) Configuration and flashing of devices
   - χ) WMN Troubleshooting
3. WMN installation
   - ♋◑ Installation of APs in the faculty
   - ♌◑ Testing
   - ♍◑ Monitoring
   - ♎◑ Evaluation

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Having actively made all necessary arrangement for the entire program the project beneficiaries were as well active during the project implementation. The program was anchored by a staff (Dr L. A. Azeez) of the Faculty from the department of Mass Communication while 2 senior lecturers from the Department of Library and Information Science (Dr A. O. Issa and Dr A. Tella).

Dr A. O. Issa delivered a lecture on Information and knowledge transfer.

Dr A. Tella delivered a lecture on titled “eLearning” The lecture explored various advantages and disadvantages of e-learning. Several initiatives such as African Academy of Languages

Association for the Development of Education in Africa (ADEA), Computer Aid International

Computers for African Schools (CFAS), Commonwealth of Learning (COL), eGranary Digital Library , eLearning Africa, Free and Open Source Software Foundation for Africa (FOSSFA)

United Nations Economic Commission for Africa (UNECA) of e-learning in Africa was highlighted. Participants were taught about the available open source e-learning tools; suc as Wiki, Online Forum – yahoo/google, etc, Dropbox, Blog, Social Networking Sites – Facebook, Twitter, ToGo, etc. and how to implement one to facilitate teaching.

Dr. A.A.Ayeni an Associate professor in the Department of Telecommunication Science in the same faculty delivered a lecture on Research topics in WMN. He emphasized on the following:

α) Routing protocols
β) Dual stacking & IPV6 WMNs
χ) Content distribution schemes in WMNs

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Figure 1: Dean of Faculty and Chief host of the workshop. Prof L.O Aina

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Figure 2: HOD TCS, Dr. Ayeni and HOD ICS, Dr. Mejabi during the workshop.

Figure 3. Mr. Thomas Gone: Talks about WMN visualization monitoring and security

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Figure 4. Mr. Thomas Gone: Demonstrating set up and configuration of MPs

Figure 5. Mr. Thomas Gone: Explaining the procedure for monitoring the WMN

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Figure 6. Dr. A. Tella delivering seminar on e-learning

Figure 7. Cross section of participants during the workshop

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Figure 8. Dr. A.O. Issa delivers lecture on Data information and knowledge transfer

Figure 9. Prof. A.A.Ayeni present seminar on research areas of WMN

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Figure 10. Dr. L.A.Azeez who anchor the workshop WMN

Figure 11: HOD Computer Science Prof J.S Sadiku, Thomas Gone and Dr. Ayeni

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Figure 12. Workshop Registration desk (Joan & Jumoke in Black suit)

Figure 13. Lai Bello & Nasir Faruk Workshop chair

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Figure 14. Isaiah student from dept of Computer Science during the Workshop

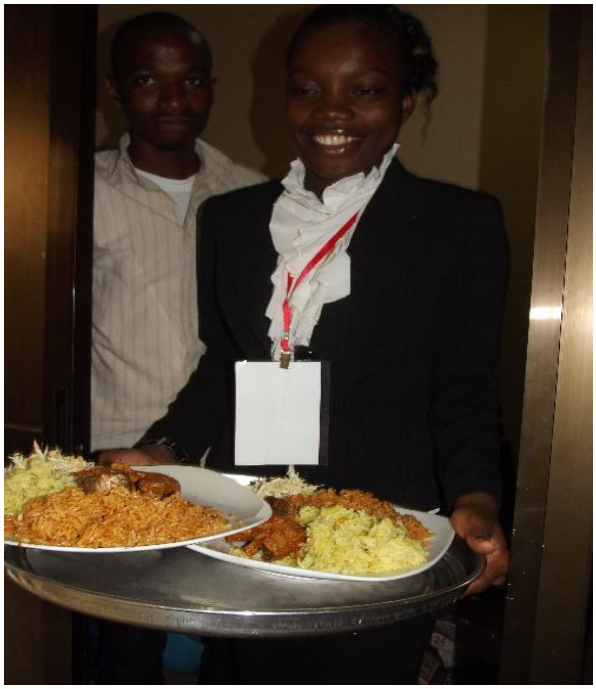

Figure 15: Lunch time

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Figure 16: Cross section of participants at lunch venue

Figure 17: Cross section of participants at lunch venue

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Figure 18: Photo of Thomas Gone with some participants at the closing

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Figure 19: Photo of students of the faculty at the closing

Aside students and staff representatives of the University, there were over six tertiary institutions and private organizations that sent their representatives to the workshop some include;

Obafemi Awolowo University
University of Ibadan
Radeemers University
Kwara State Polytechnic
Adekunle Ajasin University and
VDR communications, Ikoyi, Lagos
MTN network group, Ilorin, Nigeia
Network operating center, UNILORIN
Computer service and Information technology center (COMSIT) UNILORIN and many others

Phase II

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WIRELESS MESH NETWORK DESIGN AND INSTALLATION AT THE FACULTY OF CIS, UNIVERSITY OF ILORIN, NIGERIA

Wireless Mesh Network Technologies (Wireless Mesh Potatoes) were deployed in offices of Head of Departments and the Dean within the faculty of Communication and Information Sciences, University of Ilorin Nigeria. Alternative power supply units were also deployed at the nodes. The network is made up of a mesh of VT terminals (Mesh Potato or MP). Each MP features a wireless transceiver, telephone and RJ45 interfaces as well as industry standard PBX controllers in a robust simple weatherproof package. The telephone interface provides voice (telephony) services with the use of traditional analog telephone boxes, while the RJ45 interface provides connection to the corporate local area network (LAN) for data and computer based services. The wireless interface provides support for WiFi enabled devices such as laptop computers, tablets and mid-to-high end mobile phones. Multiple MPs are setup to form a resilient mesh network which acts as a de-centralized communication highway with 99.9% availability. Each and every telephone user on the network can call every other telephone user while they simultaneously share data. The mesh network can also be connected to the internet, hence providing internet services to all users of the network.

The network installation was successfully conducted with help of professional support from Mr. Samuel Adeyeye, and staff and students of the department of Telecommunication Science, University of Ilorin. Some of the students and staff that offered supports during the network deployment were:

IMAM-FULANI, Yusuf Olayinka and

YUSUF, Saheed Olayinka

Other students include:

Olatunbosun Olayemi Bissiriyu

AKANDE, Tajudeen Adetunji

YUSUF, Emmanuel

OPAWOYE, Ifeoluwa Afolabi and

ADEBOWALE, Quadri Ramon

After the installation, the workshop attendees, lectures and students within the faculty building were able to call one another over the six telephone boxes. Another exciting and interesting part of the project, Mr. Samuel shared his laptop internet connection (via 3G dongle) with one

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of the mobile stations (MPs). And everyone got connected to the internet via the other five mobile stations that were installed at different offices in the faculty building.

Inter-departmental calls has been ongoing since the beginning of the installation. Table 1 provides summary chat of the phone numbers of various offices. Figures 20-24 show pictures of the nodes installed at various offices within the faculty building.

Figure 20: Showing complete set of MP and battery backup

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Figure 21. Showing MP for department of ICS

Figure 22: Showing MP for department of Computer Science

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Figure 23. Interior View of the faculty

Figure 24. MP inside LIS departmental office

Project outputs, communication and dissemination activities

For communication and easy dissemination of the activities, we created a website

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httpkwaraproject.ngportal.com.

We distributed sixty (60) copies of the questionnaire to capture participants knowledge of wireless mesh network before the commencement of the workshop (see appendix A). Fifty six(56) copies representing ninety three percent (93%) was duly completed and returned. Figure 25 shows the distribution of participants by gender which was more dominated by the male.

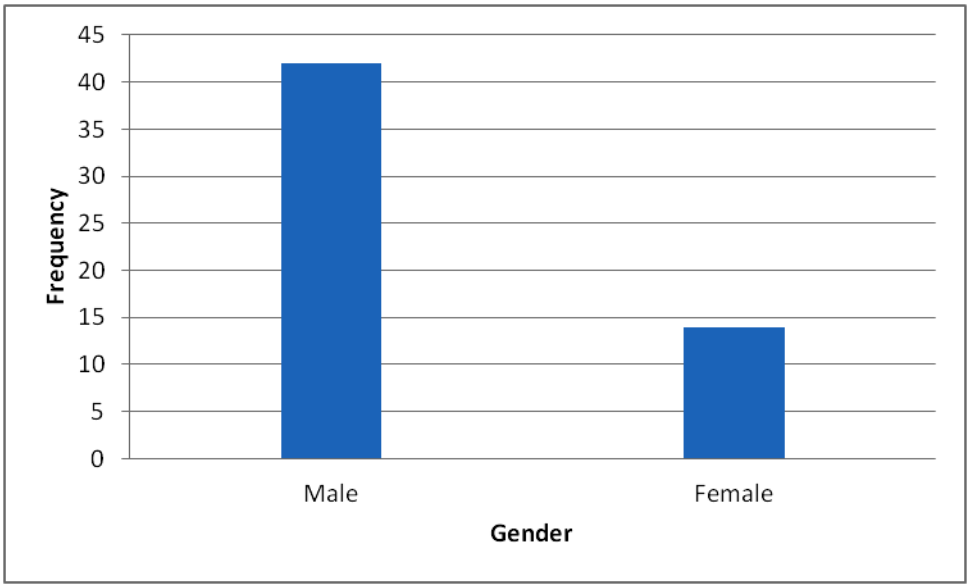

Figure 25: Distribution of Participants by Gender

From Figure 25 75% of the participants were male while, the remaining were female.

We also explored participant awareness and knowledge of WMN. Table 1 shows the results.

Table 1 Awareness of WMN

	YES	NO
Awareness of WMN	26	30
Practical Knowledge of	2	54

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WMN		

Table 2 Phone Numbers

Offices	***Number***
Dean's Office	01
Department of Telecommunication Science	02
Department of Information and Communication Science	03
Department of Computer Science	04
Department of Mass Communication	05
Department of Library and Information Science	06

A little less than 50% of the respondent claimed to have some form of awareness of WMNs. However, less than 4% of the participants had any form of practical knowledge of WMN. This indicating over 96% of the participants do not have any practical knowledge of WMN. It is also interesting to point out that about 50% of the participants fell into the category of havening no awareness and no practical knowledge of WMN.

Dissemination of project activities

The project has been published in the following:

Project Website: http:\\kwaraproject.ngportal.com.

University of Ilorin Bulletin of July 22nd, 2013.

Unilorin FM radio

Village Telco website

Kristijan Fabina

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Project outcomes

WORKSHOP PHASE

To evaluate the participants exit knowledge, another questionnaire was administered at the end of the workshop (see appendix B). The questionnaire centered on four (4) major construct, and these are; Workshop content, workshop design, workshop instruction and workshop results.

At end of the workshop all participants become fully aware about the concepts of WMN and also have considerable practical knowledge raging from the setup to monitoring of WMN. Most of the participants agreed to the suitability of the content design and instructors' of the workshop. More than 60% of the participants also attested to having accomplished the objectives of the workshop.

DEPLOYMENT PHASE

After the deployment staff from various department/units with installed technology were able to makes free call (inter-departmental calls). It was recorded that an average of 115 calls at an average holding time of 60sec were made per day. This represents 575 calls per week and 2,300 calls per months.

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Project management and sustainability

SUSTAINABILITY OF THE WORKSHOP/TRAINING

A key theme of this project is skills and knowledge transfer via training of participants. The dean of the faculty however promised to take-up the project where workshop of such would be organized on either semester or seasonal basis.

Sustainability of the Deployed WMNs

It is hoped that the idea will be sold to Nigeria Communication Commission (NCC), National University Commission (NUC), Education Trust Fund (ETF) and other non-governmental organisations (NGOs). As awareness and uptake into the programme increases, it is hoped that participants will be levied to sustain the continuous spread of the knowledge and latest developments in related areas.

For the deployed network, the faculty is expected to take full responsibility for maintenance and replacements of failed components such as the battery and other electronic devices.

It is also expected that the faculty technologists will be assigned the responsibility of routine checks on the facilities.

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Impact

- Provision of alternative, reliable and easy means of communication for staff and students of Faculty of CIS, University of Ilorin, Ilorin, Nigeria.

-Intranet

- Sharing files to-and from ***admin*** offices
- Course materials: dissemination of course material via the nodes

- At the end of the workshop, this project delivers the following:

- Awareness
- Knowledge transfer and acquisition
- Training
- Platform for research
- Donation of some WMN equipments (VT) for research
- Decrease/cut of amount he faculty/departments spent on local calls

From the record of the project outcomes, we can see that at N20 per min call, N 2,300 calls were made per day. This project is however saving the faculty of about N 50, 000 per month and valuable time that would have been spent hopping from one office to the other. However, our record had shown that within the period of three months about 6,000 calls was made which account for about N180,000. This can easily translate to a yearly call cost saving of about 700,000 can be made from the deployment of this project

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Overall Assessment

This project has immensely benefited the University community and participants from other institutions. First, it has increased the level of understanding of Wireless Mesh Networks among the staff and students of Unilorin, and the various participants. Second, the practical knowledge gained from the workshop is immeasurable. Staff and students are now aware of new or potential research ideas they can explore. An example is the automation of call logs. In order to provide some information on the frequency of use of the telephones for this report, a logbook was placed on every mobile station. While each logbook had been used to keep to record of the number of times of use of the telephones, an undergraduate student is now working on a script that could run on the phones and log the calls and time spent on each call.

The funding has been used to deploy six mobile stations in the faculty. With the equipment running 24/7 in the faculty, the faculty is now using state-of-the-art communication equipment to communicate, collaborate and share resources. In addition, the infrastructure can now be used to extend the accessibility of the e-learning application in the University.

Lastly, it worth mentioning that the infrastructure was earlier meant for the Kwara state Polytechnic as stated in the proposal. Due to administrative bottlenecks (Non response from school administration to show full commitments and willingness to partner with us on the project) we were not able to deploy at Kwara Poly and this necessitated project site to University of Ilorin. However, efforts are being made to extend the facilities there at a later stage. It is highly important we understand the operations of the equipment and that we are be able to provide support, when required for sustainability. Hence, the equipment are deployed in the Faculty of Communication and Information Sciences, University of Ilorin. We are working on our own equipment provided by NITDA (National Information Technology Development Agency) and would be linking it with the Kwara Polytechnic infrastructure at a later stage.

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Performance of the deployed network over a period of three months

The performance of the deployed network was evaluated for the period of three months (Sept-Nov 2013). The performance indicators used are as follows:

1-Number of inter-departmental calls made per week

2-Network Availability and down time

3-Clients response

After the deployment staff from various department/units with installed technology were able to makes free call (inter-departmental calls). It was recorded that an average of 115 calls at an average holding time of 60sec were made per day. This represents 575 calls per week and 2,300 calls per months. Although, about a week down time was recorded when there was power failure in the University because of storm. However, our record had shown that within the period of three months about 6,000 calls was made which account for about N180,000 at N20per minute. The response from the departments have been very welcoming though the call for internal funds for the expansion of the project has not yielded positive result yet.

FURTHER WORK ON THE PROJECT

Further work on this project is been considered in the areas of

α. **Implementation of PSTN/GSM gateway & the billing system (software purchase, application development and Integration) designed by Ernesto Gomez Tagle G (Violetta Platar) and Abdel Wahid Sabre Ousman (Ben Sabre Fils) in South Africa. so that calls can be made from the facility to mobile stations (GSM) and other public switched telephone networks outside the University.**

β. **Software Development and installation of Automatic call logs which would provide information on the frequency of use of the telephones**

χ. **Figures 26 and 27 show some of the work carried out by the South African team. The work was presented in the Free Open Source and Hardware Symposium 2013 on October 10 – 11 (report at http://bit.ly/1aUdkvR). Funds are now needed to purchase the required software for further implementation.**

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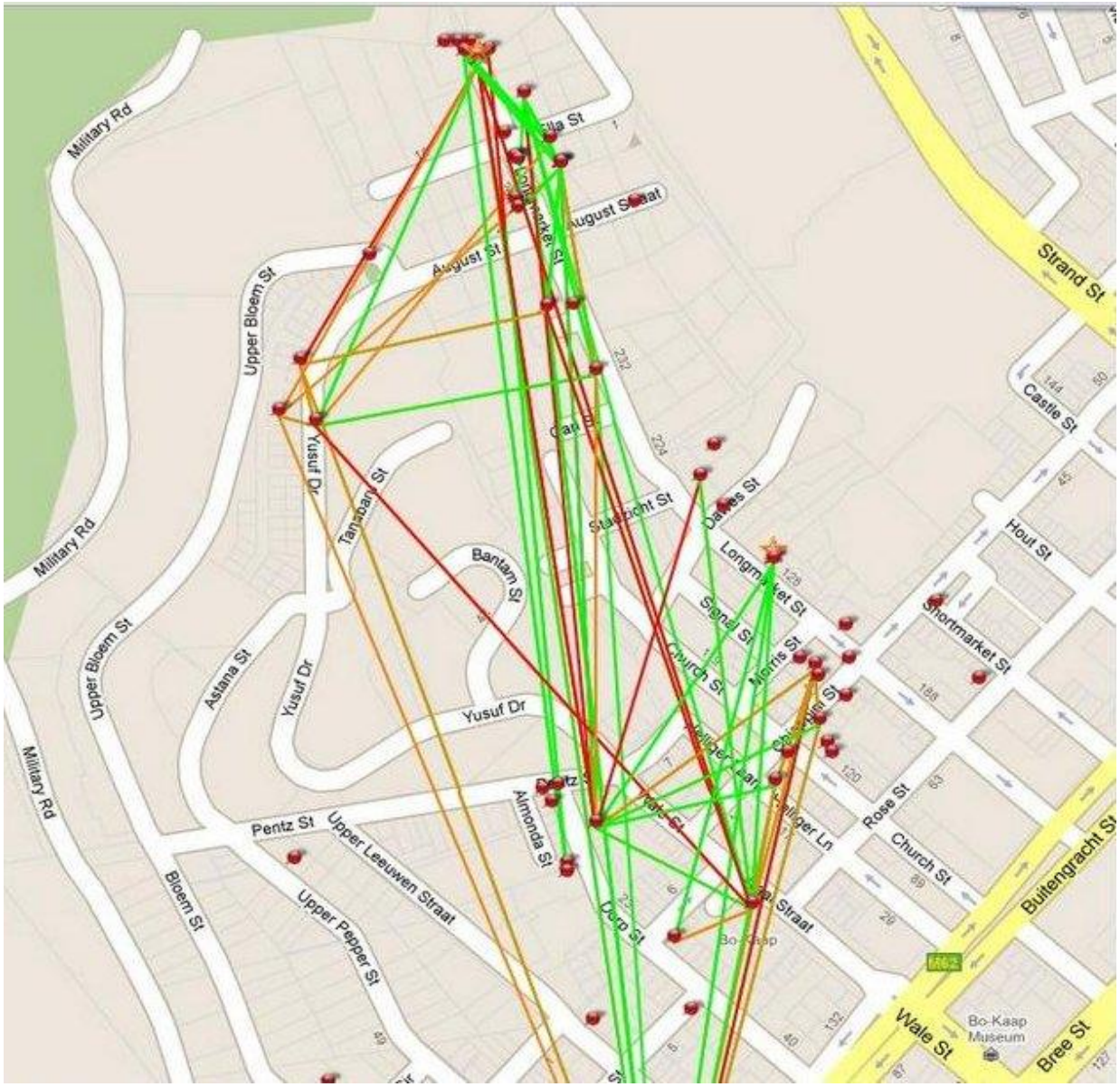

Figure 26: Map showing the coverage of WMN using PSTN/GSM gateway & billing system.

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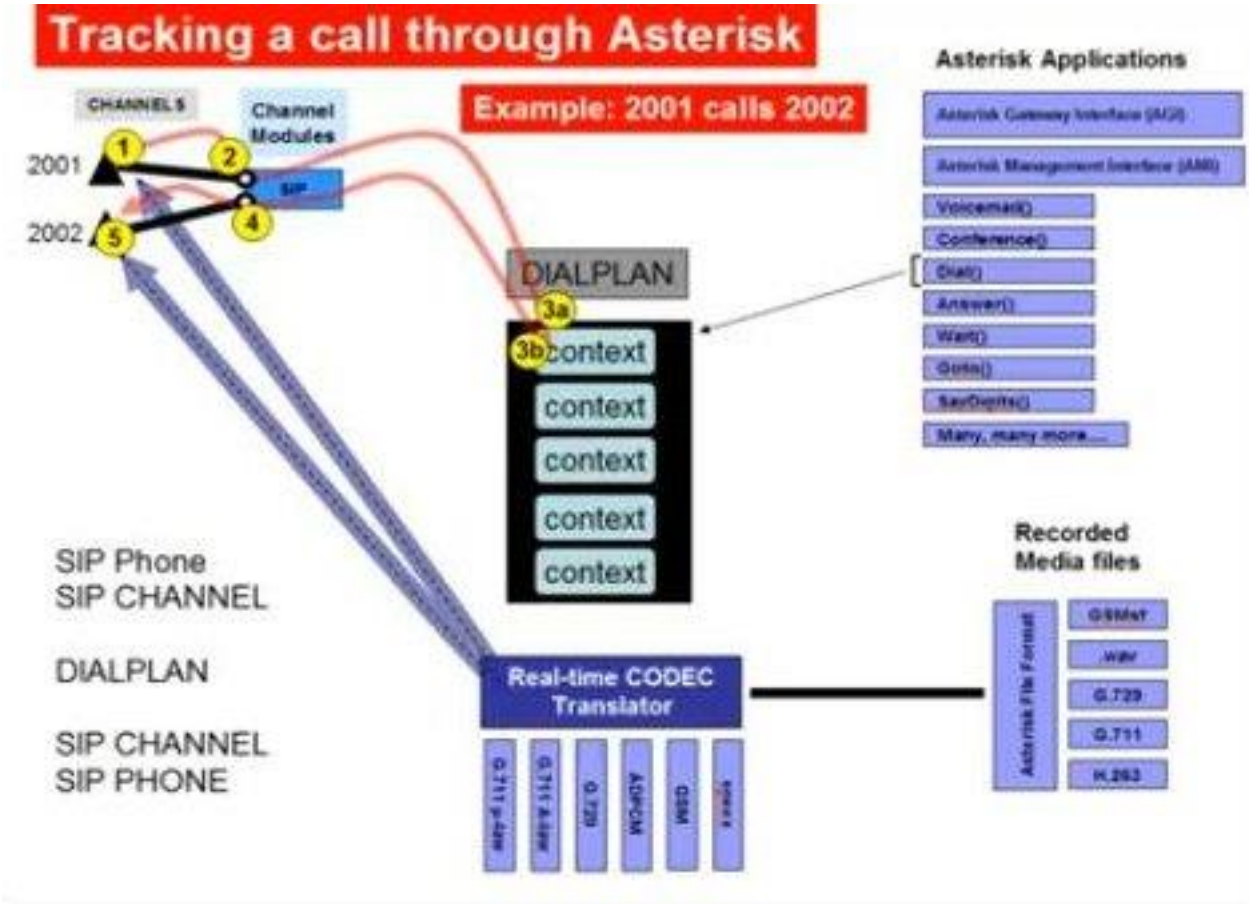

Figure 27: Asterisk Application providing information on the frequency of use of the telephones

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Recommendations

Personal sacrifices will be needed to ensure the success and sustainability of this kind of project. In addition, provisioning of an alternative power supply and willingness to maintain the project from personal savings, if necessary, are necessary. All of these are also necessary for the transfer of knowledge (i.e. trainings and workshops). We have made personally sacrifices (spending our incomes/savings over the initial payment) in order to make the project a success. As an example, we have gone as far as charging the batteries with our cars at some point. The batteries can be charged by the chargers that were submerged into the mobile stations. However, there were times that users forget to charge the batteries till they are completely drained and some of the nodes are down.
It is however recommended that the batteries should be charged on a regular basis (Every other day)

The need for supporting organizations, virtual (i.e. open source) communities and remote resource persons cannot be over-emphasized. There were times in the course of building the mobile stations, running the workshop and deploying the infrastructure that phone calls were made to persons across the continent for assistance. In addition, there must be two or sources of Internet, when running such workshops. The Internet is another vital source of information in times of trouble (and one needs to troubleshoot). All these resources play active roles in implementing projects like this one. The joint effort of the academia alone cannot do it. It is also recommended that the University should provide un interrupted internet facility during such events.

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Appendix A (Questionnaire)

WORKSHOP ON OPEN SOURCE WIRELESS MESH NETWORK PROJECTS

PRE-WORKSHOP EVALUATION QUESTIONNAIRE

Participant Name (optional): _____

Affiliation/Place of work_____

Job Title: _____

Years in present position? <1 (1-3) (3-5) >5+

Have you heard about Wireless Mesh Network before? Yes [ ] No [ ]

If yes Please describe your knowledge……..

……..

Do you have practical knowledge (Installation and Deployment) of Wireless Mesh Network? Yes [ ] No [ ]

If yes please describe your involvement……..

…….

Any other comment? .....

……..

Appendix B (Questionnaire)

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WORKSHOP ON OPEN SOURCE WIRELESS MESH NETWORK PROJECTS

PRE-WORKSHOP EVALUATION QUESTIONNAIRE

Participant Name (optional): _____

Affiliation/Place of work_____

Job Title: _____

Years in present position? <1 (1-3) (3-5) >5+

Have you heard about Wireless Mesh Network before? Yes [ ] No [ ]

If yes Please describe your knowledge……..

……..

Do you have practical knowledge (Installation and Deployment) of Wireless Mesh Network? Yes [ ] No [ ]

If yes please describe your involvement……..

……..

Any other comment? .....

……..

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WORKSHOP ON OPEN SOURCE WIRELESS MESH NETWORK PROJECTS

POST-WORKSHOP EVALUATION QUESTIONNAIRE

Participant Name (optional): _____

Affiliation/Place of work_____

Job Title: _____

Years in present position? <1 (1-3) (3-5) >5+

INSTRUCTIONS

Please check your response to the items listed below to rate aspects of the workshop on a 1 to 5 scale:

***SD**=Strongly disagree; **A**=Agree **N**=Neutral; **D**=Disagree **SD**=Strongly Disagree

***Choose **N/A** if the item is not appropriate or not applicable to this workshop.

Your feedback is sincerely appreciated. Thank you.

	WORKSHOP CONTENT	SD	A	N	D	SD	N/A
1	I was well informed about the objectives of this workshop.						
2	This workshop lived up to my expectations						
3	The content is relevant to my job						
	WORKSHOP DESIGN						
4	The workshop objectives were clear to me.						
5	The workshop activities stimulated my learning						
6	The activities in this workshop gave me sufficient practice and feedback.						
7	The difficulty level of this workshop was appropriate						

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8	The pace of this workshop was appropriate						
	WORKSHOP INSTRUCTOR (FACILITATOR)						
9	The instructor was well prepared						
10	The instructor was helpful						
	WORKSHOP RESULTS						
11	I accomplished the objectives of this workshop						
12	I will be able to use what I learned in this workshop						
	SELF-PACED DELIVERY						
13	The workshop was a good way for me to learn this content						

14. How would you improve this workshop? (Check all that apply.)

___ Provide better information before the workshop.
___ Clarify the workshop objectives.
___ Reduce the content covered in the workshop.
___ Increase the content covered in the workshop.
___ Update the content covered in the workshop.
___ Improve the instructional methods.
___ Make workshop activities more stimulating.
___ Improve workshop organization.
___ Make the workshop less difficult.
___ Make the workshop more difficult.
___ Slow down the pace of the workshop.
___ Speed up the pace of the workshop.
___ Allot more time for the workshop.

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___ Shorten the time for the workshop.

___ Improve the tests used in the workshop.

___ Add more video to the workshop.

15. What other improvements would you recommend in this workshop? .....

    .....

    .....

16. What is least valuable about this workshop? .....

    .....

17. What is most valuable about this workshop? .....

    .....

Are you interested in receiving other educational materials/workshops or e-mail updates about this project?

Yes **[ ]** No **[ ]**

If Yes, please Supply the following:

Name:

Address:

E-mail:

Phone number:

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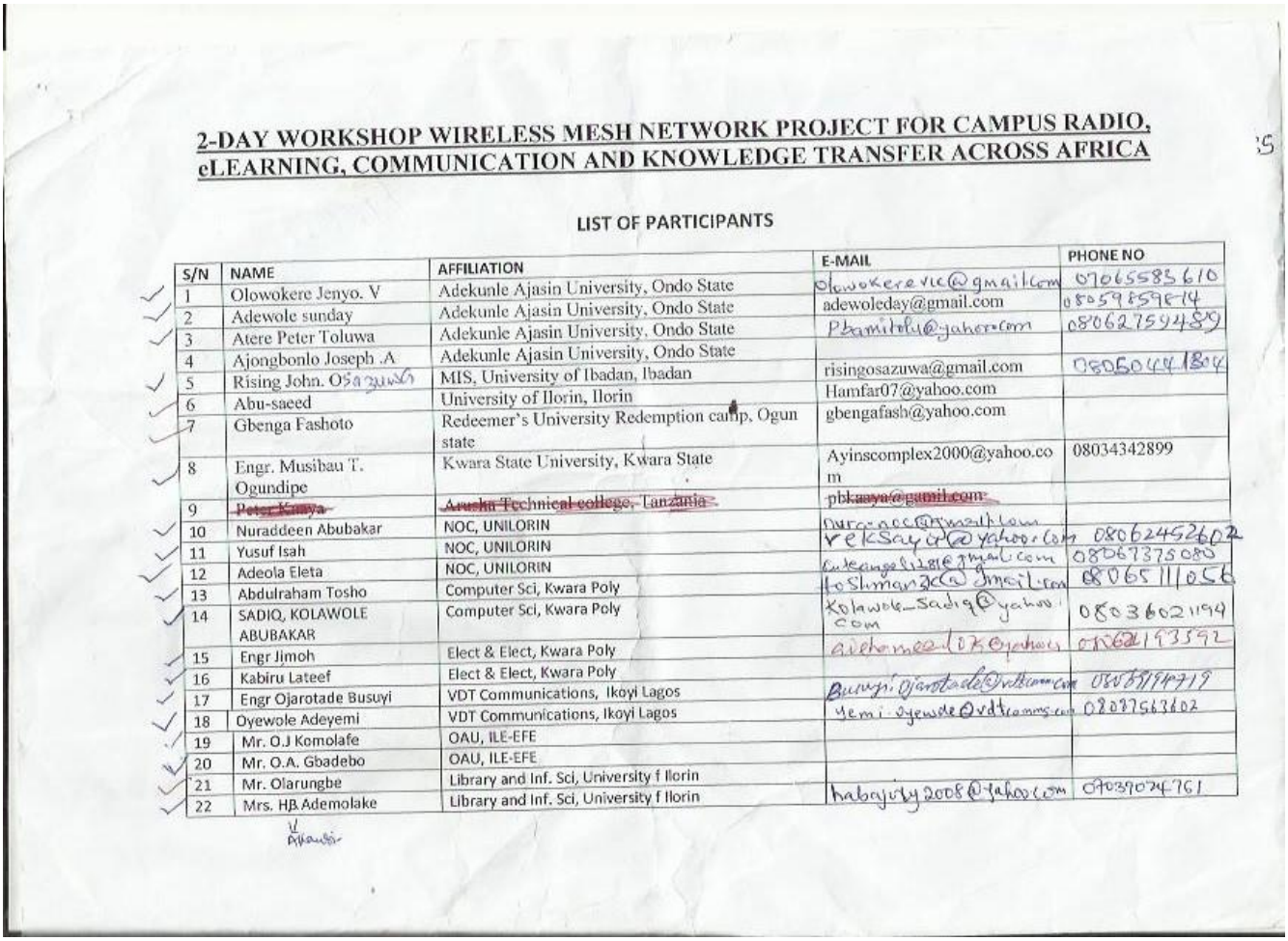
Appendix C (Attendance Sheet)



2-DAY WORKSHOP WIRELESS MESH NETWORK PROJECT FOR CAMPUS RADIO, eLEARNING, COMMUNICATION AND KNOWLEDGE TRANSFER ACROSS AFRICA

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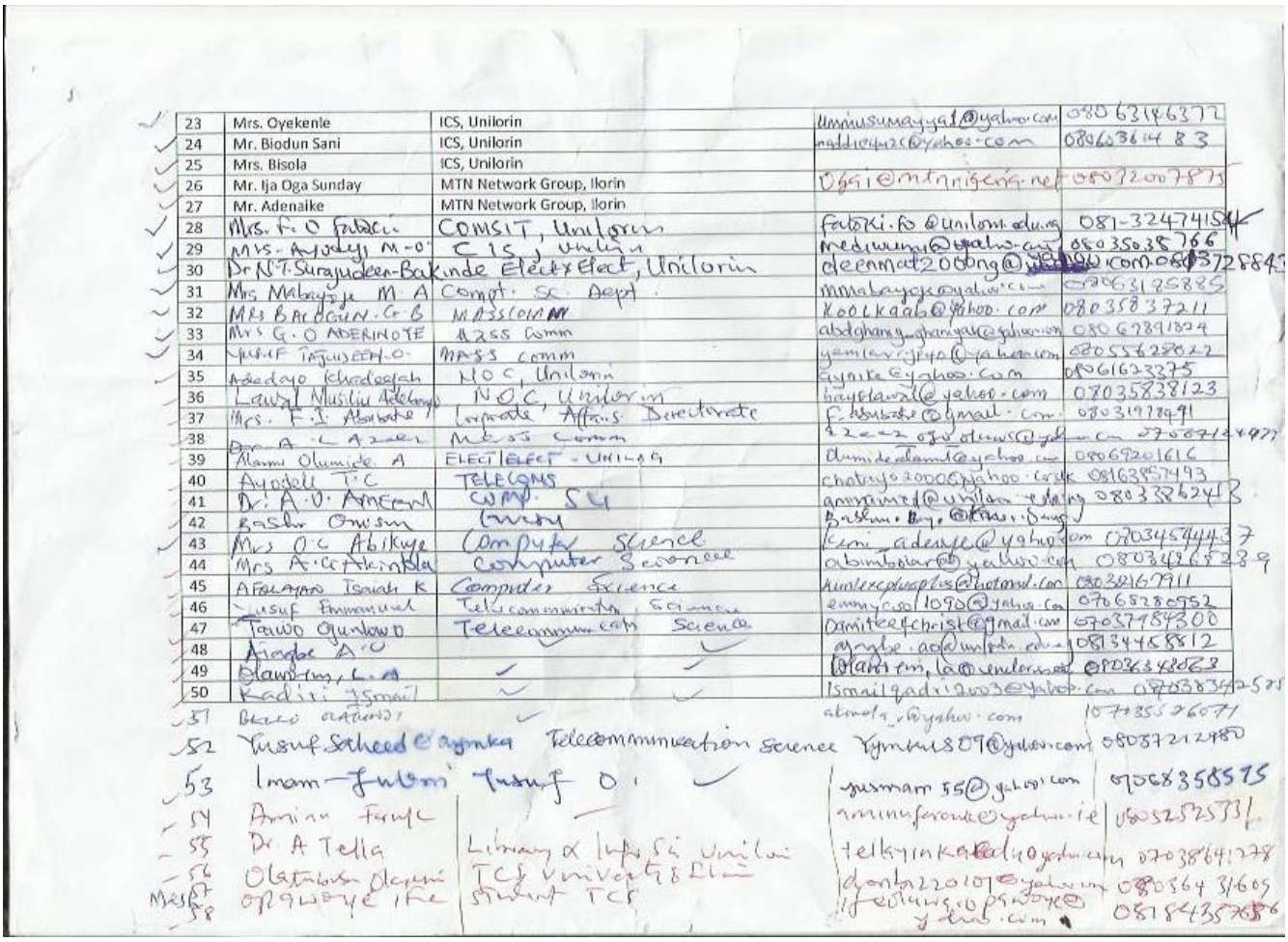

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58				

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