PRESIDENTIAL DIGITAL TALENT PROGRAM

2016/17 QUARTERLY MEETING NATIONAL REPORT FOR THE PERIOD FEBRUARY –MAY

LIQUID TELECOM KENYA

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As Presented by:

The Liquid Telecom Kenya Team

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1.0 INTRODUCTION ABOUT LIQUID TELECOM

Liquid Telecom is the leading independent data, voice and IP provider in eastern, central and southern Africa. It supplies fibre optic, satellite and international carrier services to Africa's largest mobile network operators, ISPs and businesses of all sizes. It also provides payment solutions to financial institutions and retailers, as well as award winning data storage and communication solutions to businesses across Africa and beyond. Put simply, we connect people.

2.0 OVERVIEW OF THE LIQUID TELECOM KENYA JOURNEY

The internship at Liquid Telecom kicked off on the 13th of February 2017 for a period of 3 months where 20 privileged PDTP cohorts got the opportunity to work and develop their skills in the private sector. The reception at Liquid was quite professional and welcoming.

We got the opportunity to interact with several IT professionals in the networking field as well as strong leaders and personalities like Mrs. Jackline Ogonji whose guidance and mentorship inspired us to put our best feet forward and be the best at all we did.

We were divided into various departments according to our skill sets and areas of specialization. This included Service audit team, CSS, Planning and implementation, Service delivery unit, HR, Data center, Field, Network build, Finance, End User Support and Network operations center.

Overall, the experience was informative, hands-on and enjoyable. We got the opportunity to utilize our knowledge and skills in various ICT fields practically thus bettering our future as IT professionals and technology leaders.

3.0 SCOPE OF WORK

As previously stated, we were divided into various teams according to our skills and specializations so as to better improve and sharpen them while helping out the staff at Liquid Telecom to work more efficiently and effectively. Below is a summary of the roles and responsibilities that we were allocated according to each department:

3.1 Service Audit Team (IP & Planning)

3.1.1 Team Members:

1. Michael Kariuki Muchira
2. Orpher Bochere Nyaigoti
3. John Wakahiu Mundia
4. Jackline Mumbi Muhoro
5. Nickson Maina Mwangi
6. Norah Koech Chepkoech

3.1.2 Overall Objective

Connectivity service audit and cleanup. The team in the service audit team was tasked with duty of tracing and documenting services configured in switches around the Nairobi Metropolitan area (***a total of 401 switches and 1,752 services***).

3.1.3 Specific Objectives and Activities

Training and Induction to the LTK Network

The team was taken through a 2 week training to familiarize them with the layout of Liquid Telecom's network and various technologies and devices used to bring up their services. The training was carried out by Christopher Mwangi, LTK's Engineering Manager and overall supervisor to the team with assistance from Peter Matayo (Manager Wireless Role out and Operations) and Edmond Marienga, a former PDTP in cohort 1 currently employed at Liquid Telecom as an IP Engineer. The training was informative and thorough covering areas that include:

- Vlan configuration
- Radio technologies including – wimax, omni, ODUs, IDEs, CPEs. (Monitoring and configuration)
- Cross connect, bridge domain and P2P connectivity

- Layer 2 and layer 3 switches and network technologies
- OSPF, IS-IS and BGP networks
- Switch and router configuration
- Service tracing across the Liquid Network
- Configuring Loopback IP addresses
- Accessing and extracting various service related information from different vendor switches i.e. Alcatel, Cisco, Juniper, Siemens etc.

Service Audit Objectives

- Audit all l2vpn and l3vpn services on the liquid telecom mpls network.
- Reconcile billing information per circuit on ACC-PAC with technical information on Liquid Telecoms Network.
- To streamline internal processes between Finance, Service Delivery and the Technical teams.
- To delevelop a centralised management system that contains technical and billing information.

Specific Tasks and Activities

- Logging into and extracting service related configuration on switches (Telnet and SSH).
- Verification of service state and configuration across Liquid telecom network.
- Documentation of Liquid Telecom L2 and L3 networks.
- Daily update of point to point, point to multipoint services, direct internet services on Microsoft 365 SharePoint.

Expected Outcome and Impact

- Streamlining of the information in all departments so that customer information is consistent and easy to access across all departments.
- Consistent records will lead to customer issues being discovered and handled swiftly and more efficiently.

- Cleaner and easier to access records also means that LTK can provide internet connectivity to the people of Kenya quicker and more efficiently as well.

3.2 Network Operations Center (NOC)

3.2.1 Team Member:

1. Kevin Kigundu Mwangi

3.2.2 Overall Objective

Identifying, Handling and Resolving all Network related Outages and Anomalies within the set SLA's.

3.2.3 Specific Objectives and Activities

Proactive Network Monitoring

- Monitoring the network through the various Management Systems (Solarwinds, SAM, Breeze Lite, Radwin Manager, ECI & Alcatel NMSes.)
- Monitoring the supported network technologies i.e., - IP/ MPLS, DSLAMs, STRIX Nodes, Metro SDH, Wireless BTS and DWDM and SDH Backbone and ensure they are operating optimally.
- Monitoring Local Metro Nodes, Regional Nodes, Backbone and International Back Haul Links.
- Monitoring functioning of equipment (Ethernet switches and Hubs, SDH,WDM, xPON and Microwave Base stations) and making necessary modifications to ensure systems operates in conformance with specifications
- Acknowledgement of the alarms noted on Equipment or Links and performing rapid fault diagnostic checks.
- Identification of faults and initiating corrective measures to restore affected traffic.
- Troubleshooting faults and performing mitigation and curative operations

Fault Troubleshooting and Management

- Troubleshooting network element physical, logical as well as inter-network faults and calculate the level of impact on client services.

- Grading of faults based on Severity Level (Minor, Major or Critical) and escalate accordingly.
- Restoring metropolitan, inter-regional and cross country Traffic by switching traffic to alternate routes.
- Creation of Trouble Tickets on Alarms, Anomalies and Faults on the Network
- Investigating outages or service degradation reported by Contact Center and Customer Service Teams and issuing them with Trouble Tickets.
- Providing back office support to Field Operations and Maintenance teams as well as contractors concerning faults affecting the network.
- Organizing security for the field team and ensuring they are escorted whenever they are working on faults on insecure areas.
- Liaising with the Stores for spares needed by Field Teams in replacing faulty devices/equipment
- Continually updating the internal team via mail and or SMS System on milestones achieved while working to restore faults, outages and anomalies on the network.
- Escalations Management
- Escalating Occurrence of Major and Critical Faults to Internal Technical and Management Teams through an online Text Notification platform.

Escalating faults as per Severity Levels to 2nd line Support team

- Identifying relevant contact internally in LTK and initiating communication to resolving stalemates affecting LTK Transmission/access equipment e.g. KPLC Power Disconnections, Unpaid Bills etc.
- Escalating International faults to upstream providers and engaging them until fault resolution while maintaining constant communication with both Internal Customers and the EXCO team.
- Escalating faults both internally within the company and externally with vendors where necessary.

Reporting

- Development of daily outage report and Fiber Breaks spread sheets.
- Development of Reason for Outage and Root Cause Analysis on Network Outages.

3.3 End User Support

3.3.1 Team Member:

1. Elizabeth Nyambura Mbugua

3.3.2 Overall Objectives

Learning on best practices in IT department which are governed by the ITIL framework and Standards, setting up a network where I had windows server 2008 and several windows 7 client machines and adding roles and features to the domain.

3.3.3 Specific Objectives and Activities

- DHCP role for dynamic allocation of IP addresses on the network
- Active directory role for managing users and computers in the domain
- Group policy management feature for setting up of policies to enhance security in an organization as well as managing employees productivity by ensuring employee from different department had only the require applications on their computers.
- File sharing role to allow computers in the domain to access shared files from the server.
- WSUS patch management role to manage Microsoft updates on the network. This involved synchronizing Wsus server with Microsoft Update which is the upstream server and setting up policies both on the server and on the windows 7 machines using group policy.
- DNS server role for translating domain names to IP addresses.
- Installing Lansweeper application control tool and using it to manage resources both hardware and software. Using this tool the system administrator have a record of the number of desktop and laptops deployed and their status. Monitoring softwares installed on the network, which softwares are authorized and track on software changes and Access detailed reports from a particular publisher.

- Using Solarwinds network performance monitoring software to manage switches and routers in critical and warning state and resolving issues. ICMP protocol manages where the node is up or down while SNMP protocol monitors whether all ports in a node are working. Using iTop help desk system to resolve IT support issues raised by employees.
- Using ADAudit tool to audit active directory, logon/logoff, file server and windows server to monitor logon events, domain policy changes, organization unit changes, group policy objects changes computer changes, group changes and user changes to generate reports and alerts.

3.4 SERVICE DELIVERY UNIT

3.4.1 Team Member:

1. Derrick Kipsum
2. Kevin Wanjohi Kangara

3.4.2 Overall Objectives

Providing end-user support for the suite of applications, communications and infrastructure across the organization, as well as the provision of the department's records management services. It acts as immediate link between internal employees, external stakeholders, clients and existing customers.

3.4.3 Specific Objectives and Activities

- Receive and assign fiber/wireless surveys from the sales team to respective department.
- Asset recovery from client's who have ceased Liquid services.
- Link upgrades and downgrades.
- Temporary and permanent mapping of links.
- Liaise contractors to ensure installations and scheduled maintenance is carried on time.
- Weekly production of status reports for all fiber and wireless projects and their progress.
- Asset requisition.
- Any other duty assigned from time to time.

3.5 CUSTOMER SUPPORT SERVICES

3.5.1 Team Member:

1. Pauline Ndwiga
2. Vincent Cheruiyot

3.5.2 Overall Objectives

Responsible for providing excellent customer service, remote technical support and resolution based on tickets raised to the satisfaction of the LTK internal/external customer within the shortest time possible. The role provides 24/7 supports to customers and is an escalation point to both internal teams and the customers.

3.5.3 Specific Objectives and Activities

Service Assurance

- Provide measures to ensure that client's services are assured and maintained as up.
- Monitor functioning of equipment and make necessary modifications to ensure systems operates in conformance with specifications.
- Diagnose/troubleshoot faults and perform mitigation and curative operations

Escalation Management

- Identifying faults that have lasted more than 3 hours establishing cause of outage
- Identifying relevant contact internally in LTK and externally with vendors/customers and communicate escalation
- During times of major fault, shall be required to manage escalations both internally and externally Escalate gateway faults to upstream providers and engaging them until fault resolution while maintaining constant communication with both internal/external customers
- Escalate faults both internally within the company and externally with vendors where necessary

Reporting

- Assessment of required report output
- Development of reporting templates
- Development of the reports, as per requirement i.e. Regular Change Management on Client Services

- Receiving change requests from commercials through ticket
- Evaluation/assessment of change request, against available network infrastructure
- Implementation of change requests
- Update of tickets, with relevant information of changes implemented

Service Delivery

- Upgrades and Downgrades of circuits, as per request from relevant commercial departments
- Terminations and Disconnections as requested by other departments
- Migration of client services to new setups either backhauls, technologies
- IP address allocation to client services, and providing returns to AFRINIC on IP address utilization
- Bandwidth Management of client services

Customer Project Management

- Developing scope of work, according to project plan
- Implementation of project schedule
- Participate in project progress meetings
- Documentation of project progress
- Resource management
- Be available to provide technical expertise during ongoing technical projects

Focus areas of Responsibility

- Cases assigned resolved within 4hours after assignment
- Cases for escalation escalated accordingly within 2hours after working on the case
- Solutions Designed must be sustainable
- All trouble Tickets updated with accurate details within 24hours before closing of the TT
- All reports (Daily, Weekly, Monthly and Customer) generated within the required time
- Training unit peers, juniors and commercial departments on relevant technical concepts
- Customer Services Surveillance in 24x7 environments and alerts/notifications send out

- RCA and RFO prepared and shared accordingly within 72hours after permanent fault resolution
- Solving customer problems using substantial analysis and investigation related to network and system performance.

3.6 FINANCE

3.6.1 Team Member:

1. John Mwangi Njuguna
2. Dominic Korir Kiprotich

3.6.2 Overall Objectives

The 3 Months internships at Liquid Telecommunications has been great and I can confidently say am I have learnt a lot ranging from the technical aspects to the professional point of view. The members of staff have been supportive and encouraging in all areas. Key among the daily activities include the following:

3.6.3 Specific Objectives and Activities

- **Provide Technical and General support on ACCPAC** – This involves assisting in providing technical and general guidance and support to all staff in the company that are using ACCPAC.
- **Cheques Posting** –I have been assisting the AR staff in posting cheques and other documents in the system and preparing cheque deposit slips on a daily basis.
- **Run Periodic processes on ACCPAC** – Was able to assist in running of various month end processes which are necessary for a smooth and efficient close of financial period.
- **Updating the Billing File**-I have been assisting the AR staff in updating the Billing file when necessary and also the tax details
- **Design and Customize Reports on ACCPAC** – Assist in improving existing report and designing new reports within ACCPAC.
- **Run Monthly Reports** – Assist in running monthly reports as required within Finance Department.
- **Manage workflows on the ACCPAC** – Assist in managing ACCPAC workflow – This includes Circuit Termination and Maintenance, LSO workflow and advanced service delivery implementation workflow.

- **Integration with other Systems** – Assist in all integration between ACCPAC and other systems – This will include managing ACCPAC and HAI integration and developing any other new platform
- **Develop Key performance indicators –** Assist in developing performance indicators in the ACCPAC – This will be done between ACCPAC and Norming ESS.
- Any other system related responsibility allocated by the system administrator and the AR staffs.

3.7 HUMAN RESOURCE

3.7.1 Team Member:

1. Joseph Mitiini Yonga

3.7.2 Overall Objectives

Coming up with an innovative software solution to integrate the reception and the HR departments. This was to facilitate visitors tracking and interview process tracking.

3.7.3 Specific Objectives and Activities

Systems design:

Describes desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudocode and other documentation.

Development:

The real code is written here.

Integration and testing:

Brings all the pieces together into a special testing environment, then checks for errors, bugs and interoperability.

Acceptance, installation, deployment:

The final stage of initial development, where the software is put into production and runs actual business.

Maintenance:

During the maintenance stage of the SDLC, the system is assessed to ensure it does not become obsolete. This is also where changes are made to initial software. It involves continuous evaluation of the system in terms of its performance.

Evaluation:

Some companies do not view this as an official stage of the SDLC, while others consider it to be an extension of the maintenance stage, and may be referred to in some circles as post-Implementation review. This is where the system that was developed, as well as the entire process, is evaluated. Some of the questions that need to be answered include: does the newly implemented system meet the initial business requirements and objectives? Is the system reliable and fault-tolerant? Does the system function according to the approved functional requirements? In addition to evaluating the software that was released, it is important to assess the effectiveness of the development process. If there are any aspects of the entire process, or certain stages, that management is not satisfied with, this is the time to improve. Evaluation and assessment is a difficult issue. However, the company must reflect on the process and address weaknesses.

Disposal:

In this phase, plans are developed for discarding system information, hardware and software in making the transition to a new system. The purpose here is to properly move, archive, discard or destroy information, hardware and software that is being replaced, in a manner that prevents any possibility of unauthorized disclosure of sensitive data. The disposal activities ensure proper migration to a new system. Particular emphasis is given to proper preservation and archival of data processed by the previous system. All of this should be done in accordance with the organization's security requirements.

3.8 PLANNING AND IMPLEMENTATION

3.8.1 Team Member:

1. Nicholas Ngumo karari

3.8.2 Overall Objectives

The overall objective was mapping fibre to clients on a secondary level of duty. The main duty would be updating our networks file in the google earth so as to see the stretch of our fibre network. I was responsible for coming up with the cost estimations that would be used to inform the client on the installation cost ranges.

3.8.3 Specific Objectives and Activities

- When a sales person finds a client, he gets the coordinates where the fibre will be dropped.
- A ticket is then created under wingu (the in-house ticketing system) and assigned it to Service Delivery Unit (SDU).
- The SDU then distributes the work to our department.

- Once I get the request I get the coordinates and search them on google earth. Once spotted I plot the best possible route that the new fibre will follow.
- After that I calculate the cost using a predefined template and get the cost.
- Once I finish I send the excel document to SDU who then update the sales personel.
- When that is done the sales team follows due process and if the project is approved, the project department gets in the whole process.
- The project people then request for a route design from us, which majorly requires the coordinates of existing and proposed manholes.
- The design also points out the fibre optic cable pulling.
- Once that is done we sent it back to projects who follow the due process.
- Then we finally receive the actual survey report from projects, which we are supposed to verify the costs that the contractors have estimated.
- Then we issue a verification status back to projects.

3.9 FIELD

3.9.1 Team Member:

1. John Ongaki Isaboke

3.9.2 Overall Objectives

Field operations is a department that comprises four sections namely -- fibre, maintenance, electricity and civil works.

3.9.3 Specific Objectives and Activities

Field Operations

- Performing fibre (ODF) Termination
- Performing fusion splicing
- Operation of the OTDR
- Cleaving, Stripping
- Fibre frequencies
- Switch configuration
- Data Centre Operation and arrangement (EADC)
- Power upgrades to sites (Inverter installations)

- General maintenance and troubleshooting of physical networking equipment
- New sites acceptance from the Build team
- Running Proofs of concepts before actual installations

Network Operations Center

- Liquid telecom Kenya network topology layout
- Wingu system (Ticketing and reporting)
- N.M.S (Solarwinds) monitoring tool
- MLPS and VPNMLPS
- SDH/DWDM segements
- Base stations
- Troubleshoting network faults an isolated links
- Dark Fiber
- Understanding basic switching concepts & the operation of Cisco switches
- Troubleshooting fisrt hop redundancy (HSRP)
- Troubleshooting using OSPF and EIGRP
- Troubleshooting wireless routers and wireless clients
- Resolving common switched network media issues, configuration issues, switch hadware failures
- Describing enhanced switching technologies such as VLANs and VLAN trunking
- Managing CISCO IOS configuration files
- Services STM-1, VC4,VC3,VC12, STM-64
- Ethernet services - EOSDH, EOS
- TOP 200 companies
- Critical Faults (Regions Isolations,Backbone, Hubs)
- Major Faults (Switches and non-service affecting)
- Resons for outage (RFO) Estimated Time of Arrival (ETA) Estimated time of Resolution (ETR)
- Service lead agreement (4 hours)
- Escalation of Faults

- Cycle of new client (Presales-customer implementation,Mappinfg and CSS,Projects, BUILD
- DWDM - vendors Alcatel SDH1660,1642,DWDM1626,
- ECI - vendors SDH-BG,XDM1000
- Microwave- vendors Radwin, Motorola, ubigutti,

4.0 EAST AFRICA DATA CENTER

4.0.1 Team Member:

1. Benson Kaume Mwenda
2. Shadrack Kilenge

4.0.2 Overall Objectives

EADC houses servers for various clients. It is designed to ensure redundancy and availability as the clients are assured of 99.99 % uptime (Tier 3 certified). It also acts a point where it provides connectivity between various ISP as well as connectivity between an ISP and a client.

4.0.3 Specific Objectives and Activities

- Performing cross connects between clients and service providers.
- Physical server installation and server environment management.
- Switches, routers and servers logical configuration.
- Cables and racks management.
- Working with automated building management system.
- Server rescue and structured cabling.

4.1 NETWORK BUILD

4.1.1 Team Member:

1. Jethro Kiplangat Kigen

4.1.2 Overall Objectives

Implementation and maintenance of fiber backbone both in installation/rollout of new sites.

4.1.3 Specific Objectives and Activities

As an infrastructure rollout engineer my main tasks were:

- Configure BG-20B (SDH Network), Cisco ME 3600X Series switch (FS and TS) and Alcatel Omnistack LS 6224 switch just before they are taken to the field for installation.
- Upgrade Cisco licenses and iOS software on Cisco ME 3600X Series switches.
- Receive ISR's – Internal Stock Requisition forms and make sure that all the requested items are available for issuance by the store's personnel and ready to be picked by fiber splicing technicians for installation.
- Test new and recovered network equipment before deployment.
- Any other task as assigned by supervisor.

As a fiber splicing technician my main tasks were:

1. Splicing new fiber optic sites by;
   - Location of existing manholes nearest the new site to ensure enough cable slack.
   - Intercepting the live fiber optic cable and securing it in an enclosure kit.
   - Identifying the exact strands for the planned subring to be inserted.
   - Breaking the strands and splicing in the new site.
2. Provisioning and Testing new fiber optic links by;
   - Going through manholes to clear high losses, micro bends in closure kits and ensuring the cables are coiled well inside the manhole.
3. Troubleshooting Fiber Optic links.
4. Fault management
   - Perform curatives (fault resolution) on fiber transmission links within the stipulated times.
   - Escalate faults taking longer than 2 hours to team leader and update line managers and Network Operations Center (NOC) on the fault status.
   - Identify areas of network weakness and suggest measures for improvement or corrective action.
5. Any other task as assigned by supervisor.

5.0 CHALLENGES, LESSONS AND OBSERVATIONS

5.1 CHALLENGES

Some of the challenges that PDTP ICT management trainees faced while interning at Liquid Telecom include:

- **Insufficient Time -** The time allocated for private sector internship w.r.t Liquid Telecom was relatively short as their network is vast and as such required more time to not only get acclimated to its operations but to also learn and see various tasks and / or projects to fruition, effectively.
- **Limited Access to the Premises -** It was a challenge gaining access at the entrance since we did not have biometric authentication. We had to wait for an employee using the entrance so that we could use it as well.
- **Expensive lifestyle -** The cafeteria and other amenities around LTK were quite expensive resulting to cohorts being forced to find alternative solutions for sustenance that required long walks over large distances which resulted to wasted productive time.
- **Conflict of Schedules -** Liquid Telecom is a high structured organization with laid out procedures to follow. When it came to attending trainings, it was a challenge as we were to fill leave forms in advance and this meant leaving our work unattended. The days allowed for leave at Liquid are only 4 days and we took surpassing leave days which was bringing a conflict of schedule.
- **Lack of Timely Communication -** Requirements for the attached cohorts such as, meeting the mentor, filling work plans, and attending trainings was not communicated in advance. This led to confusions as we had to fill leave forms every time we needed to attend such meetings.
- **Company Orientation -** Lack of a comprehensive orientation of the interns to the various departments so as to get an overall picture of how processes flow within the company. An orientation pamphlet could come in handy here.
- **Proper Work Attire for Fields Ops -** Lack of proper work attire like overall/apron and the likes that is suitable for field conditions.

5.2 LESSONS AND OBSERVATIONS

While working at Liquid Telecom, a couple of things captured our interests and attention. From the efficiency and timely nature in which technical issues were captured and resolved to the professional, team-based and goal oriented manner in which daily business was conducted. Working at Liquid Telecom Kenya has really been an inspiring and eye-opening experience that has molded us into better ICT professional since we were able to learn and observe the following:

- **Team Work is Vital –** Some tasks are way too large or require a short duration of time to be completed alone. One must therefore learn how to work with others so as to get the job done efficiently while maintaining a healthy working relationship.
- **Leadership Skills –** An effective leader not only gets the job done but motives his team to do their best while providing a clear road map on how the end goal will be achieved. As observed from the leadership at Liquid Telecom, all department heads and team leaders were available and provided motivational talks that helped us grow both professionally and personally as individuals. Meetings were had to discuss the on goings of the company and targets that were both achieved and those that needed to be achieved. Outstanding employees were also rewarded and recognized for their achievement and this gave employees the motivation to do their best.
- **Timeliness –** Time management is an important skill both in one's professional life as well as in one's personal life. Liquid Telecom provides services to thousands of people, ranging from large corporations and mid-sized business to individual citizens in the country; some of whose services would cause chaos if interrupted e.g. banks. It is therefore crucial for them to handle all issues that arise in a timely fashion so as to avoid any down time and complications that those issues may cause.

  In light of this fact, time management is a value that is held highly at Liquid Telecom and any tardiness has serious consequences. This has taught us to be better managers of our time.

6.0 CONCLUSSION

In summation, the three month journey we have had at Liquid Telecom has been quite inspiring and we have really learnt a lot. It has given us the opportunity to sharpen our skill and utilize them in a real working environment with deadlines, targets and expected results. We have had inspiring and motivational role models who have walked with us through our journey correcting us and pushing us to be the best versions of ourselves. For this we are truly grateful to both ICT Authority and Liquid Telecom for giving us this rare opportunity to put our skills into good use and learn from the best.