Liquid Telecom South Africa (L.T.S.A)

A PROJECT REPORT SUBMITTED

by

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Requirements for the Degree of

Master of Computer Application

Under the Supervision of

Prof. Ankit Verma

ASSISTANT PROFESSOR

Submitted to

Faculty of MCA

DR. A.P.J ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW

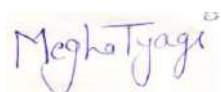**(Formerly Uttar Pradesh Technical University, Lucknow)**

(JULY 2021)

DECLARATION

I hereby declare that the work presented in this report entitled " (L.T.S.A)", was carried out by me. I have not submitted the matter embodied in this report for the award of any other degree or diploma of any other University or Institute.

I have given due credit to the original authors/sources for all the words, ideas, diagrams, graphics, computer programs, experiments, results, that are not my original contribution. I have used quotation marks to identify verbatim sentences and given credit to the original authors/sources.

I affirm that no portion of my work is plagiarized, and the experiments and results reported in the report are not manipulated. In the event of a complaint of plagiarism and the manipulation of the experiments and results, I shall be fully responsible and answerable.

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CERTIFICATE

Certified that **Megha Tyagi** (**1900290149061**) has carried out the project work presented in this report entitled "**(L.T.S.A)**" for the award of **Master of Computer Application** from Dr. A.P.J. Abdul Kalam Technical University, Lucknow under my supervision. The report embodies result of original work, and studies are carried out by the student himself and the contents of the report do not form the basis for the award of any other degree to the candidate or to anybody else from this or any other University.

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INTERNSHIP COMPLETION LETTER

This is to certify that Ms. Megha Tyagi, D/O – Mr. Subhash Chand Tyagi, a MCA student of Krishna Institute of Engineering and Technology, UPTU University, Has successfully completed the internship Program from 04th January 2021 to 30th June 2021 with Alphacodes IT Solutions Pvt. Ltd. During the Period of her internship program with us she was found to be punctual, hardworking and a quick learner, who had a fair understanding of her subjects.

For
Alphacodes IT Solutions Pvt. Ltd.

Ritesh Kumar
HR Department

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L.T.S.A
Megha Tyagi

<u>ABSTRACT</u>

This project This term paper will analyze Liquid Telecom, an internet service provider. Liquid Telecom provides connectivity, communications and payment solutions for a large range of sectors including banking, hospitality, education and government. This paper will look into their :-

☐ Current Strategies
☐ Operating Assumptions
☐ Business Model

It is important to see how they are prepared for disruptive changes in the market

This project is an attempt to provide the advantages of network to customers of a best networking. It helps to use the best services of networking in the place anywhere through networking by using a web device. Thus, the customer will get the service of online and service for his/her good connection. This system can be implemented to any connection in her/his locality through networking.

If networking is providing in the world, then the customers can enjoy easy service from anywhere, the services will not be losing any more customers to the trending of uses internet. Since the application is available through the internet it is easily accessible and always available.

ACKNOWLEDGEMENT

I take this occasion to thank God, almighty for blessing us with his grace and taking our endeavor to a successful culmination. I extend my sincere and heartfelt thanks to our esteemed guide, **Prof**. **Ankit Verma**, for providing me with the right guidance and adviceat the crucial junctures and for showing me the right way. I extend my sincere thanks to our respected **Head of the department Dr. Ajay Kumar Shrivastava**, for allowing us to use the facilities available. I would like to thank the other faculty members also, at this occasion. Last but not the least, I would like to thank my friends and family for the support and encouragement they have given me during our work.

MEGHA TYAGI

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CHAPTER 1

INTRODUCTION

This project is a ISP-based Application system for a better connectivity with us through internet. The project objective is to better networking throughout the environment.

Liquid Telecom is the leading independent data, voice and IP provider in eastern, central and southern Africa. It supplies fiber optic, satellite and international carrier services to Africa's largest mobile network operators, ISPs, financial institutions and businesses of all sizes. Liquid Telecom has built Africa's largest independent fiber network which runs from the north of Uganda to Cape Town, currently spanning over 18,000km across borders and covering Africa's fastest-growing economies, where no fixed network has existed before. Liquid Telecom's network provides connectivity onto the five main subsea cable systems landing in Africa; WACS, EASSY, SEACOM, SAT3 and TEAMs. Working under various brands, the Liquid Telecom Group has operating entities in Botswana, DRC, Kenya, Lesotho,Mauritius, Nigeria, Rwanda, South Africa, Uganda, UK, Zambia and Zimbabwe. The company has been named Best African Wholesale Carrier for the last two years running at the annual Global Carrier Awards.
.

The design should be in such a way that there will be no single points of failure and shouldbe capable of achieving fast and predictable convergence times. The design should also address the ease of scalability by increasing the port density in the switches. This Low-Level Design has been made in accordance with Cisco's existing best-practice recommendations. The foundation of the design stems from Cisco's standard 'Multilayer Network Design' model.

The aim of the network is to provide highly available and scalable environment for collocation of Internet, Intranet and Extranet services, and applications. It is providing high-speed access to data, voice, and internet-based applications. The network is planned such that it will provide the necessary backbone connectivity between the different offices to ensure that the network becomes an enabler for business plans.

1.1 Company Profile

Liquid Telecom was founded in 2004 and has remained a privately -owned,independent company. Originally a satellite and voice operator, in 2009 Liquid Telecom launched their high-speed,cross- border fiber network linking southern Africa to the rest of the world. And now they have grown to provide services to more than 50 global wholesale carriers operating in eastern, central and southern Africa ,Europe ,North America and Asia Pacific, as well as the national and international enterprise market.

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Africa's Cloud provides your business with:

Flexibility: Liquid Intelligent Technologies offers an elastic cloud model that enables our customers to scale quickly and on-demand.

Reliability: Liquid Intelligent Technologies provides direct connectivity to the cloud on our highly resilient, meshed network.

Security: Liquid Intelligent Technologies' secure network and dedicated connections to the cloud ensure your data is always protected.

Find out more about how Liquid Intelligent Technologies can support your journey to Africa's Cloud.

Fig. 1.1 services

1.1.1 Definition

Liquid Telecom Group has operating entities in Botswana, DRC, Kenya, Lesotho,Mauritius, Nigeria, Rwanda, South Africa, Uganda, UK, Zambia and Zimbabwe. The company has been named Best African Wholesale Carrier for the last two years running at the annual Global Carrier Awards.

- The network operating system (Windows) on the user's PC (client) and server.
- The cables connecting all network devices (user's PC, server, peripherals, etc.).
- All supporting network components (hubs, routers, and switches, etc.).
- Computer Network means an interconnected collection of autonomous computers.

Fig. 1.2 Live project

1.1.2 Liquid Features

Cyber Security solutions designed to ensure your staff continue working, securely from anywhere

Liquid Secure Remote Access:

Liquid Secure Remote Access provides Zero Trust Network Access (ZTNA) to private applications and data in public cloud, on-premises and/or data center environments.

This simple and secure remote access solution offers seamless connectivity for authenticated users, supports any application and protocol, reduces business risk, and simplifies IT infrastructure and management. Liquid Intelligent Technologies' Secure Remote Access offers a more efficient, secure and scalable set-up versus traditional VPNs.

Liquid Cloud Protection:

Liquid Cloud Protection provides advanced public cloud infrastructure security that helps you manage and reduce risk across your public cloud deployments. The solution simplifies the detection and

remediation of threats and misconfigurations across your cloud environments. Helping prevent data loss, stop malware, and achieve regulatory compliance.

Liquid Intelligent Technologies's Cloud Protection solution offers standard and advanced protection options, safeguarding data in motion from leakage, theft, or exposure, and data at rest in managed cloud services. Simply put, not only can we protect users and data, but also users who access your business data while using the public internet from any location

Cloud Services

Businesses can no longer afford to miss out on the huge opportunities being presented by cloud-based services, which are transforming IT strategies and business models worldwide.

Africa's Cloud provides your business with:

Flexibility: Liquid Intelligent Technologies offers an elastic cloud model that enables our customers to scale quickly and on-demand.

Reliability: Liquid Intelligent Technologies provides direct connectivity to the cloud on our highly resilient, meshed network.

Security: Liquid Intelligent Technologies' secure network and dedicated connections to the cloud ensure your data is always protected.

Liquid Virtual Workplace

Since putting our first fiber in the ground in 2009, our high-speed cross-border network has grown to over 100,000km of fiber. It is the continent's largest independently owned network, offering connectivity to all the main subsea cable systems that link Africa to the rest of the world.

We are also the first to establish a direct terrestrial communication link between Cape Town, South Africa, and Cairo, Egypt - stretching the entire length of the continent and offering improved latency.

What is an ISP

An Internet service provider is an organization that provides services for accessing, using, or participating in the Internet. Internet service providers can be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

What are the Requirnments of ISP

- It must be a gateway to the internet to their customer
- Must provide connection between offices (end-end)
- Reliable connectivity must be ensured
- 24/7 operational
- Install a router in your data center for your upstream connection. The router needs to work with the fiber connection installed by the telecom company you chose. Plug it in, then begin configuring it with the settings given to you by your fiber provider.
- Enable the network address translation (NAT) and dynamic host configuration protocol (DHCP) options so customers can connect to your service.
- Test the router by connecting it to a computer. If you installed it correctly, your computer will be able to go online.
- The setup process varies from router to router. Consult your fibre provider for troubleshooting.

CPE

In telecommunications, a customer-premises equipment or customer-provided equipment is any terminal and associated equipment located at a subscriber's premises and connected with a carrier's telecommunication circuit at the demarcation point.

These services are from the first 3 layers from the OSI model

Layer 1 (Physical)	Fibre , Ethernet, Copper, Transmission.
Layer 2 (Data link)	Voice mac addressing , Vlan broadcast
Layer 3 (Network)	Internet, MPLS (uses infrastructure from ISP) IP routing , L3 voice

<u>Microsoft 365 Intelligent cloud services and advanced security</u>

Microsoft 365 is the productivity Cloud that brings together best-in-class Office apps, intelligent cloud services and advanced security to help your business achieve more.

Are you looking for Office 365? Then you've come to the right place. Microsoft Office 365 is now Microsoft 365. It is a new name but still offering the same great value at the same price.

Microsoft 365 is an integrated solution that brings together the productivity of Office 365 business apps, intelligent Cloud services, and advanced security. Microsoft 365 gives your team the freedom to take the office anywhere and continue collaborating using their favorite Microsoft Office applications and innovative communication tools.

Microsoft 365 for business
New name, same great value, same price.

Fig. 1.3 Liquid overview

Microsoft 365 is a monthly subscription service, there is no requirement for massive upfront capital outlay. Only provide users with the tools they need and scale when your business needs it.

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There are two general types of tools scope:

- Snow
- 360

1.2.1 <u>Service now</u>

ServiceNow is a [platform-as-a-service](#) provider, providing technical management support, such as [IT service management](#), to the IT operations of large corporations, including providing [help desk](#) functionality. The company's core business revolves around management of "incident, problem, and change" IT operational events. Their fee model was based on a cost per user (seat) per month,
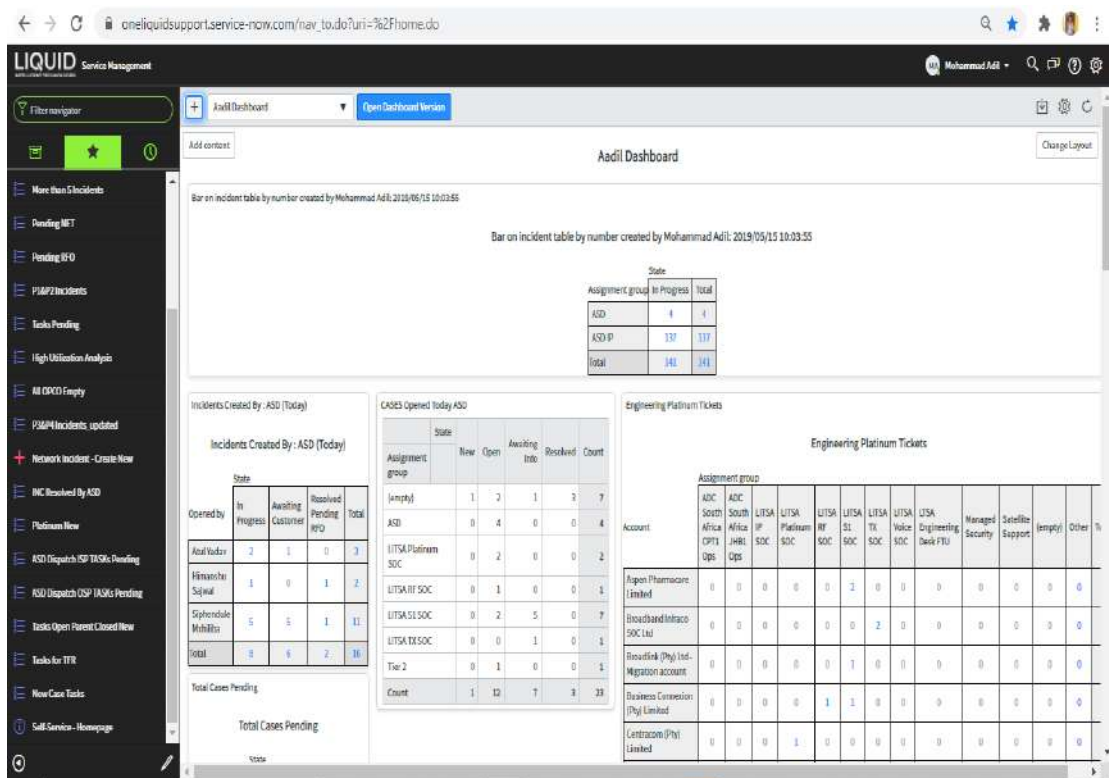

Fig. 1.4 service now

1.2.2 360 Degree view

A 360-degree view of the customer refers to the single, end-to-end picture of a customer's journey with an organization and the experiences they face along the way. It is a strategic approach that enables businesses to offer the best customer experience across all channels by allowing a unified view of customer touchpoints. In this competitive marketplace with so much data generated and collected for each customer, bringing every single source together in one place gives organizations the ability to ensure they have a sound understanding of the wants, needs, and concerns of every individual.


Fig. 1.5 360

1.2 <u>Hardware Tools</u>

- Windows Version- Windows.

- 2 GB Ram

- 1MB Cache Memory

- External Memory 10 GB

- Clients − Clients are computers that request and receive service from the servers to access and use the network resources.

- **Peers** − Peers are computers that provide as well as receive services from other peers in a workgroup network.

- **Transmission Media** − Transmission media are the channels through which data is transferred from one device to another in a network. Transmission media may be guided media like coaxial cable, fiber optic cables etc., or maybe unguided media like microwaves, infra-red waves etc.

- **Connecting Devices** − Connecting devices act as middleware between networks or computers, by binding the network media together. Some of the common connecting devices are:

    A Router:

    A router is a device that connects two or more packet-switched networks or subnetworks. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses, and allowing multiple devices to use the same Internet connection.

    There are several types of routers, but most routers pass data between LANs (local area networks) and WANs (wide area networks). A LAN is a group of connected devices restricted to a specific geographic area. A LAN usually requires a single router.

- A router forwards the packet based on the information available in the routing table.

- It determines the best path from the available paths for the transmission of the packet.
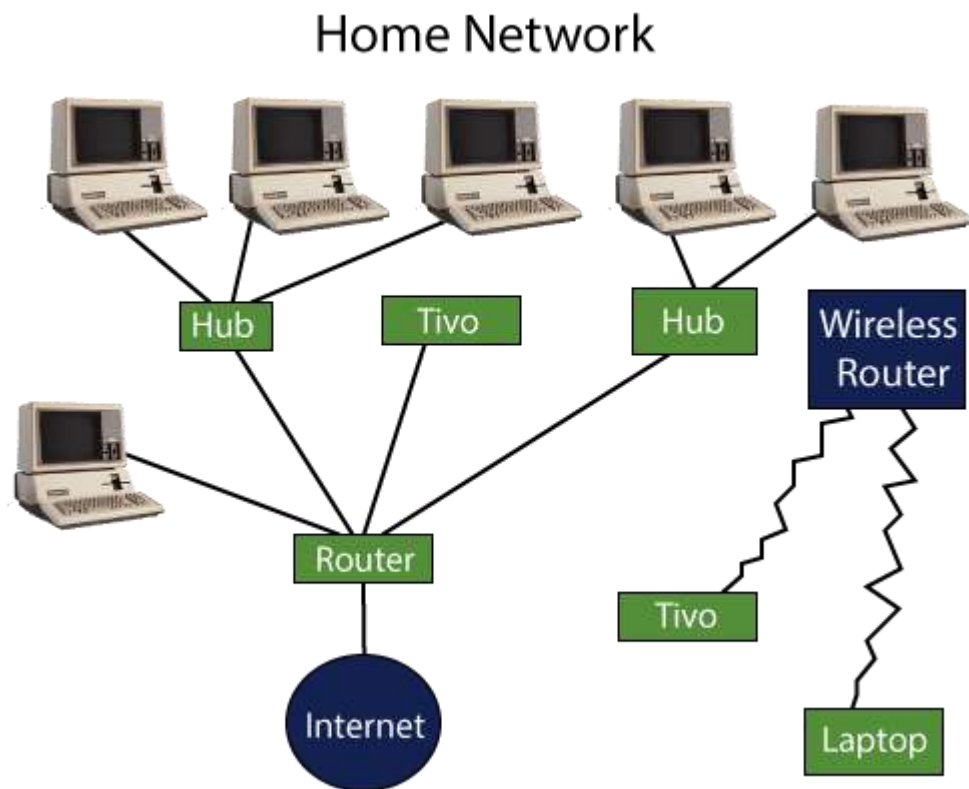
Home Network

Fig. 1.6 Router

b. Bridges:

A bridge is one of the network devices in computer networks to connect two or more communication networks or network segments and creates a single network. It provides interconnection with other computer networks, which use the same protocol. The multiple local area networks (LANs) can be connected to form a larger local area network.
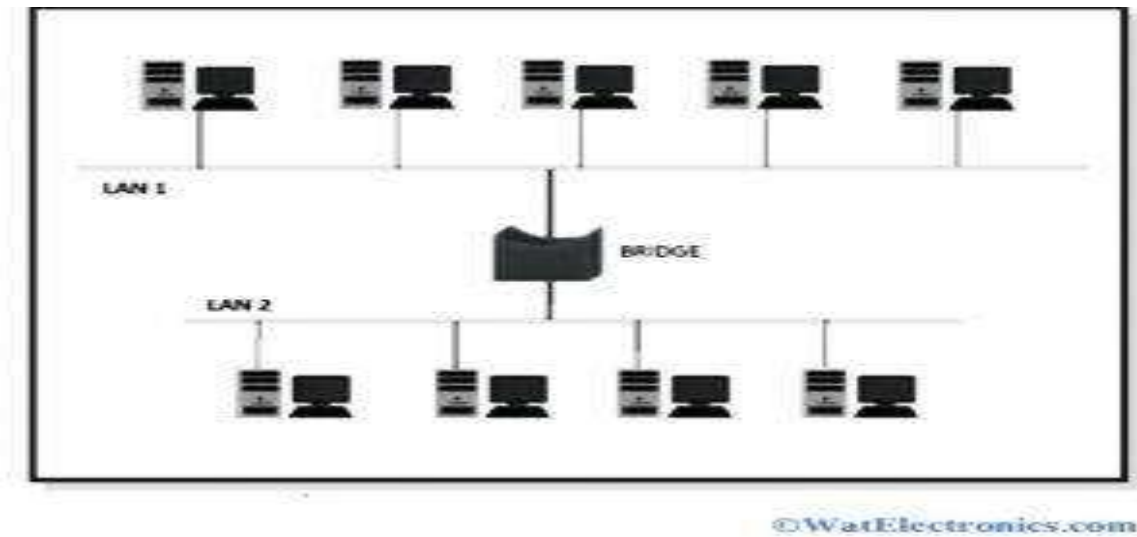
Fig. 1.7 Bridge

c. Hubs:

Networking hubs are central components of local area networks (LANs). To understand the role of networking hubs, a basic understanding of LANs is required.

The networking hub is a junction box with several ports in the back for receiving the Ethernet cables that are plugged into each computer on the LAN. With Ethernet cables going from each NIC to the hub, all computers are connected to the hub.

Fig. 1.8 Hub

d. Repeaters:

A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal becomes too weak or corrupted to extend the length to which the signal can be transmitted over the same network. An important point to be noted about repeaters is that they do not amplify the signal. When the signal becomes weak, they copy the signal bit by bit and regenerate it at the original strength. It is a 2-port device.

Fig 1.10 Repeaters

e. Gateways:

A network gateway joins two networks so the devices on one network can communicate with the devices on another network. Gateways serve as the entry and exit point of a network. For basic Internet connections at home, the gateway is the Internet Service Provider that gives you access to the entire Internet.

A gateway is often associated with a router. Routers can be gateways because a router can control the path through which information is sent in and out.

The default gateway is the machine IP number that you need to access to get to the rest of the network or the Internet.

Fig. 1.10 Gateway

14
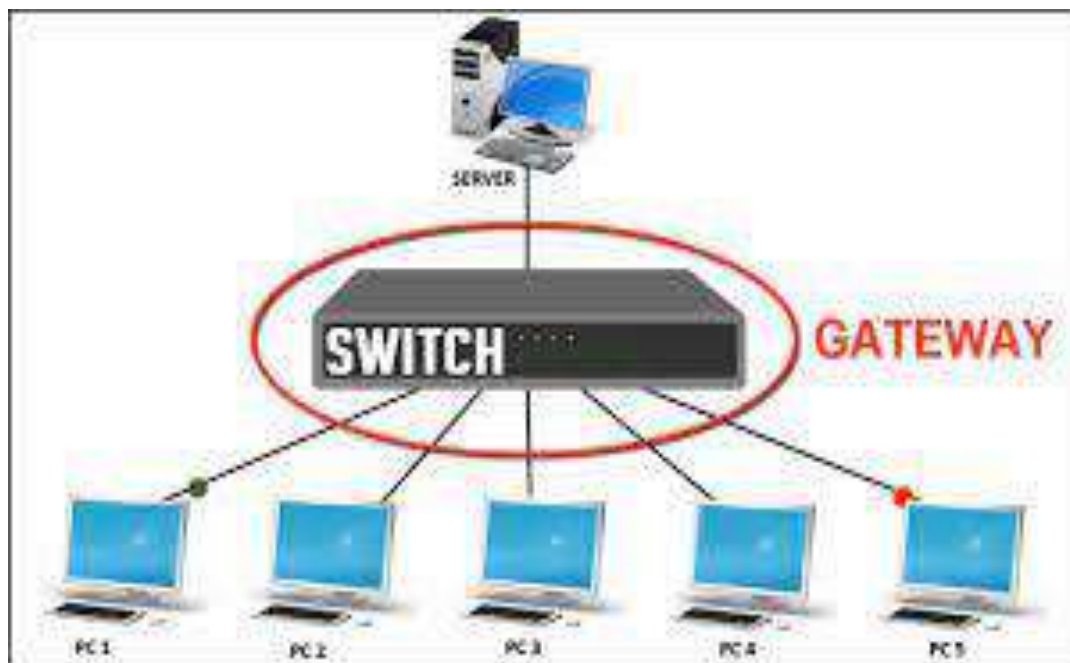
f. Switches:

A switch is a hardware device that filters and forwards network packets. A network switch also connects computers to each other, like a hub. When a switch receives a packet of data, it determines what computer or device the packet is intended for and sends it to that computer only. It does not broadcast the packet to all computers as a hub. For this reason alone, switches are usually preferred over a hub.
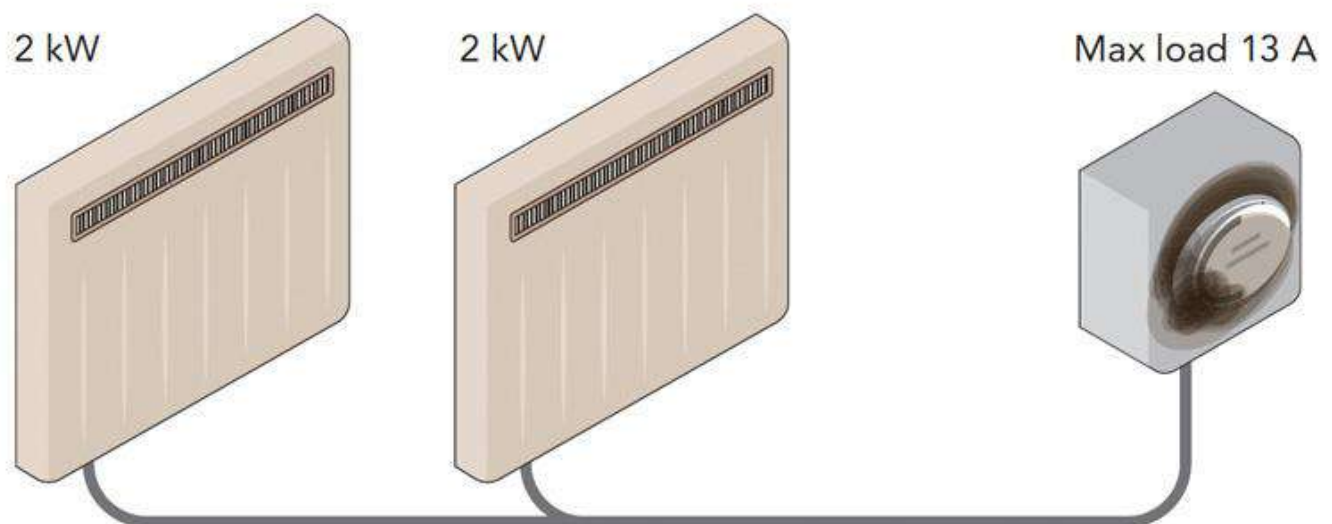
Fig 1 **Example of a time switch used to control an unsuitable load**

Fig. 1.11 Switch
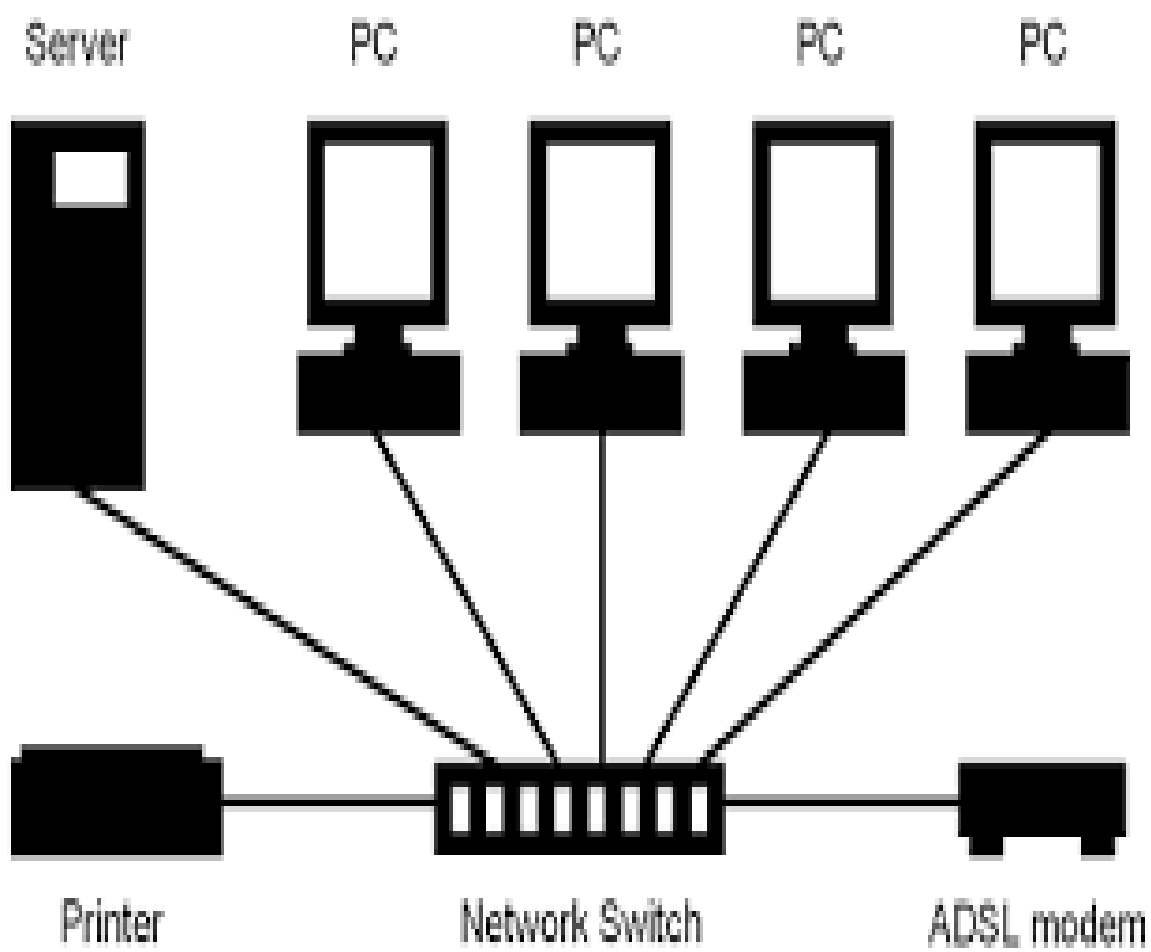
Fig 1.12Connectivity image

1.3 Software Tools

Dalo radius:

Dalo RADIUS is an advanced RADIUS web platform aimed at managing Hotspots and general-purpose ISP deployments. It features rich user management, graphical reporting, accounting, and integrates with Google Maps for geo-locating (GIS). Dalo RADIUS is written in PHP and JavaScript and utilizes a database abstraction layer which means that it supports many database systems, among them the popular MySQL, PostgreSQL, Sqlite, MsSQL, and many others.
It is based on a Free RADIUS deployment with a database server serving as the backend. Among other features it implements ACLs, Google Maps integration for locating hotspots/access points visually and many more features. Dalo RADIUS is essentially a web application to manage a radius server so theoretically it can manage any radius server but specifically it manages Free RADI

Cramer Web Report

In recent years the ability to generate genomic data has increased dramatically along with the demand for easily personalised and customisable genome browsers for effective visualisation of diverse types of data. Despite the large number of web-based genome browsers available nowadays, none of the existing tools provide means for creating multiple visualisation instances without manual set up on the deployment server side. The Cranfield Genome Browser (CRAMER) is an open-source, lightweight and highly customisable web application for interactive visualisation of genomic data. Once deployed, CRAMER supports seamless creation of multiple visualisation instances in parallel while allowing users to control and customise multiple tracks.

Info vista

- Network Product Monitored in info Vista

17

- URL

  Note: Open the below link via **internet explorer** to login NMS tool

https://infovistainternal.liquidtelecom.co.za/VPortal/portal/page/Index.jsp?timeout=true&pagename=P_A6CC487ED14A4F8DBA07FC5EA0E46B7D#P_A6CC487ED14A4F8DBA07FC5EA0E46B7D

- **Login Page**

Enter user name -->> Password ->> click login

- **First Widget**

Connection of Devices

Chapter 2

Literature Review

2.1 Networking

Networking refers to connected computing devices (such as laptops, desktops, servers, smartphones, and tablets) and an ever-expanding arrays of IoT devices (such as cameras, door locks, doorbells, refrigerators, audio/visual systems, thermostats, and various sensors) that communicate with one to another.

2.2 Connectivity Between devices

Specialized devices such as switches, routers, and access points form the foundation of computer networks.

Switches connects and help to internally secure computers, printers, servers, and other devices to networks in offices or organizations. Access points are switches that connect devices to networks without the use of cables.

Routers connect networks to other networks and act as dispatchers. They analyze data to be sent across a network, choose the best routes for it, and send it on its way. Routers connect your home and business to the world and help protect information from outside security threats.

While switches and routers differ in several ways, one key difference is how they identify end devices. A Layer 2 switch uniquely identifies a device by its "burned-in" MAC address. A Layer 3 router uniquely identifies a device's network connection with a network-assigned IP address.

Today, most Routers include some level of routing functionality.

MAC and IP addresses uniquely define devices and network connections, respectively, in a network. A MAC address is a number assigned to a network interface card (NIC) by a device's manufacturer. An IP address is a number assigned to a network connection.

According to Mowery, the Internet originated in a diverse set of industrial economies, the USA was consistently the source of critical innovations and an early adopter of new applications. The Internet, not play a larger role in its development, particularly in the creation of new business organizations, governance institutions, and applications. The presence of a large domestic market, a set of antitrust and regulatory policies that weakened the power of incumbent telecommunications firms, and a diverse private/public research community that was willing to work with both domestic and foreign inventions were important preconditions for US leadership in computer networking innovation [1].

According to Haas, the small unit of wireless spectrum in the radio frequency bands has led to a rapid growth in research in wireless networking using light, known as LiFi (light fidelity).In this paper an overview of the subsystems, challenges and techniques required to achieve this is presented [2].

According to Hayes, the concept of socialised networking, the focus of this article, targets the development of online communities in higher education, and, as part of the admission process. A successful case study of a networking is presented on how one university has used this tool to compete for students. A discussion including suggestions on how to enhance the success of this tool in your recruitment process is also provided [3].

According to Rekimoto, this paper introduces "SyncTap", a user interface technique for making a network connection between remote devices. When a user wants to connect two devices, he or she synchronously presses and releases the "connection" buttons on both devices. Then, multicast packets that contain press and release timing are sent to the network. By comparing this timing with locally recorded one, both devices correctly identify each other. This scheme is simple but scalable because it can detect and handles simultaneous overlapping connection requests [4].

According to Livingstone, the establishment of digital networks seems to be important in both processes. This paper aims to explore these aspects by analyzing the competitiveness of firms in four different sectors of the manufacturing industry: Digital, chemicals, electronics, and vehicles. Data have been obtained from a survey conducted specifically for this purpose at company level in Spain. Findings from the empirical analysis, based on the application of the Polytomous Logistic Universal Model (PLUM), confirm the positive effects that the ability to network has on organization performance [5].

According to Farhady, Organizational and security theory are identified as the major starting points for theory building. Hypotheses are generated from the network of Euro-Atlantic security institutions, which has become the most sophisticated networking of its kind since the early 1990s. The article looks specifically at the genesis of dyadic inter-organizational relations and of entire security, at the relevance of networking for policy output and at the system effects that networks have on individual organizations. The theoretical findings are presented to allow a transfer to other geographical and functional areas of networking [6].

2.3 Packets sending/Receiving Flow

Modern-day networks deliver more than connectivity. Organizations are embarking on transforming themselves digitally. Their networks are critical to this transformation and to their success.

According to O'Donnell, the concepts of switches and networking as a means of exploring how entrepreneurs "do business". More recently, attempts have been made to show how the process of networking contributes to small firm marketing. The overall research study on which this paper is based aimed to show how Telecommunication contributes to marketing. This paper focuses on a specific objective of the overall research study, namely an understanding of the process of small firm networking. It reviews previous research into the concept of networking and demonstrates how the process of network flow can be captured as several dimensions along which entrepreneurial networking may vary [7].

According to Dressler, the communication and telecommunication technologies have yielded many existing and envisioned information network architectures such as cognitive radio networks, sensor and actor networks, quantum communication networks, terrestrial next generation Internet, and Interplanetary Internet. The existing bio-inspired networking and communication protocols and algorithms devised by looking at biology as a source of inspiration, and by mimicking the laws and dynamics governing these systems are presented along with open research issues for the bio-inspired networking [8].

According to Brandtzæg, the recent popular network media platforms is the social networking site (SNS). Thus far, few previous studies have empirically investigated people's motivations for SNS usage, especially not outside the U.K This study combines a large-scale quantitative and qualitative research design, by asking 1,200 SNS users an open question regarding their reasons for using SNSs. An important conclusion drawn from a preliminary content analysis is that people often report many motivational reasons for using SNSs [9].

According to Bhattacharjee, Active networking offers a change in the usual topology paradigm: from passive carrier of bits to a more general computation engine. however, involves significant challenges in interoperability, security, and scalability. In this paper we define an active networking architecture in which users control the invocation of pre-defined, network-based functions through control information in packet headers. architecture allowing applications to exercise some control over network processing, the bandwidth allocated to each application's packets can be reduced in a manner that is tailored to the application, rather than being applied generically [10].

The types of network architectures that are evolving to meet these needs are as follows:

- Software-defined (SDN): In response to new requirements in the "digital" age, network architecture is becoming more programmable, automated, and open. In software-defined networks, routing of traffic is controlled centrally through software-based mechanisms. This helps the network to react quickly to changing conditions.

- Intent-based network: Building on SDN principles, intent-based networking (IBN) not only introduces agility but also sets up a network to achieve desired objectives by automating operations extensively, analyzing its performance, pinpointing problematic areas, providing all-around security, and integrating with business processes.

- Virtualized system: The underlying physical network infrastructure can be partitioned logically, to create multiple "overlay" networks. Each of these logical networks can be tuned to meet specific security, quality-of-service (QoS), and other requirements.

- Controller-based: Network controllers are crucial to scaling and securing networks. Controllers automate networking functions by translating business intent to device configurations, and they monitor devices continuously to help ensure performance and security. Controllers simplify operations and help organizations respond to changing business requirements.

- Multidomain integrations: larger enterprises may construct separate networks, also called networking domains, for their offices, WANs, and data centers. These networks communicate with one another through their controllers. Such cross-network, or multidomain, integrations generally involve exchanging relevant operating parameters to help ensure that desired business outcomes that span network domains are achieved.

Only Cisco offers a complete portfolio of modern network architectures for access, WANs, data centers, and cloud.

According to Chell, networking by owner-managers of small businesses will enhance business performance. The presence of networking activity is suffused with methodological difficulties. A sparse use of institutional networks; an association between networking

activity and business performance, although it seems that this must be qualified by sectoral differences; an association between type of owner-manager on a scale of entrepreneurship and networking activity [11].

According to Ida, broadband Internet access services has been remarkable. However, two main problems have emerged concerning broadband migration: migration from narrowband to broadband services and migration inside broadband services. Focusing on the latter problem, this paper reaches two conclusions. First, in terms of the type of users who initially migrated to the fiber to the home (FTTH) service is analyzed. It is found that income levels. Second, the lock-in effects of NTT, which provides both asymmetric digital subscriber line (ADSL) and FTTH, are analyzed [12].

According to Pavelić, the area is so broad that it touches all areas of everyday life. Since the expected number of IoT devices that will be connected in next 5 years is tens of billions, security threads are one of the crucial areas to be solved to have such huge number of connected devices. This paper is explaining different threats and on the example of smart door lock system are explained potential problems and how they are solved [13].

According to Giannakis, deals with decentralized data algorithms for in-network processing of graph-valued data. Without exchanging elements from the distributed training sets and keeping inter-node communications at affordable levels, the local (per-node) learners consent to the desired quantity inferred globally, meaning the one obtained if the entire training data set were centrally available. Impact of the decentralized learning framework to contemporary wireless communications and networking tasks is illustrated through case studies including target tracking using wireless sensor networks, unveiling Internet traffic anomalies [14].

According to Ünver, the sphere of such a mighty system like international (mobile) communication and Internet provider and security issues are based. The multi-stakeholder community controls and manages the critical resources of the Internet. In general, we are experiencing a change or power shift due to the digital revolution on the economic basis of our global society. The change in (digital) technical infrastructure and the upcoming of powerful AI systems [15].

CHAPTER 3

FEASIBILITY STUDY

As the name implies, a feasibility analysis is used to determine the viability of an idea, such as ensuring a project is legally and technically feasible as well as economically justifiable. It tells us whether a project is worth the investment—in some cases, a project may not be doable. There can be many reasons for this, including requiring too many resources, which not only prevents those resources from performing other tasks but also may cost more than an organization would earn back by taking on a project that isn't profitable.

A well-designed study should offer a historical background of the business or project, such as a description of the product or service, accounting statements, details of operations and management, marketing research and policies, financial data, legal requirements, and tax obligations. Generally, such studies precede technical development and project implementation.

- 3.1 Types of Feasibility Study

A feasibility analysis evaluates the project's potential for success; therefore, perceived objectivity is an essential factor in the credibility of the study for potential investors and lending institutions. There are four types of feasibility study—separate areas that a feasibility study examines, described below.

3.2 Economical Feasibility

System is economical feasible and can be easily implement with minimum hardware and software resources as this is a cloud based application platform is provided by cloud provider only there is a need of Internet connection and a Browser application. It is very important for designer to first analyze the system economically and determines that project is economical feasible or not. Costs and benefits of the proposed computer system must always be considered together, because they are interrelated and often interdependent. Although the systems analyst is trying to propose a system that fulfills various information requirements, decisions to continue with the proposed system will be based on a cost-benefit analysis, not on information requirements. In many ways, benefits are measured by costs, as becomes apparent in the next section.

3.3 Technical Feasibility

 It is the study of the function performance and constraints that may affect the ability to achieve an acceptable system. The project development requires designer to have technical knowledge of salesforce.com for both application development and database system. Technical feasibility is one of the most important criteria for selecting material for digitisation. The physical characteristics of source material and the project goals for capturing, presenting and storing the digital surrogates dictate the technical requirements. Libraries must evaluate those requirements for each project and determine whether they can be met with the resources available. If the existing staff, hardware and software resources cannot meet the requirements, then the project will need funding to upgrade equipment or hire an outside conversion agency. If these resources are not available, or if the technology does not exist to meet the requirements, then it is not technically feasible to digitise that material.
Considerations for technical feasibility include:

- *Image capture:* Image capture requires equipment, such as a scanner or a digital camera. Different types of material require different equipment, and different equipment produces images of differing quality. When selecting materials for digitising, technical questions that need to be addressed include: does the original source material require high resolution to capture? Are there any oversized items in the collection? Are there any bound volumes in the collection? What critical features of the source material must be captured in the digital product? In what condition are the source materials? Will they be damaged by the digitisation process?

- *Presentation:* Presentation refers to how the digitised materials will be displayed online. Consider the following questions to determine the technical feasibility of presenting the digitised material:
  Will the materials display well digitally?

  How will users use the digital versions?

  How will users navigate within and among digital collections?

  Do the institutionally supported platforms and networked environment have the capability for accessing the images and delivering them with reasonable speed to the target audience?

  Do the images need to be restricted to a specified community?

  Do the images need special display features such as zooming, panning and page turning?

3.4 Behavioural Feasibility

In the application domain our system works as an application. There are simple form to fill and service requires no ambiguous entries, all the behavioural entries are simple and GUI based. The system design is very user friendly, interactive. The application should be used by Administrator. People are inherently resistant to change, and computers have been known to facilitate change. An estimate should be made of how strong a reaction the user staff is likely to have toward the development of a computerized system. [t is common knowledge that computer installations have something to do with turnover, transfers, retraining, and changes in employee job status. Therefore, it is understandable that the introduction of a candidate system requires special effort to educate, sell, and train the staff on new ways of conducting business.

3.5 Operational Feasibility

Operational feasibility is the measure of how well a proposed system solves the problems, and takes advantage of the opportunities identified during scope definition and how it satisfies the requirements identified in the requirements analysis phase of system development.[10]

The operational feasibility assessment focuses on the degree to which the proposed development project fits in with the existing business environment and objectives with regard to development schedule, delivery date, corporate culture and existing business processes.

To ensure success, desired operational outcomes must be imparted during design and development. These include such design-dependent parameters as reliability, maintainability, supportability, usability, producibility, disposability, sustainability, affordability and others. These parameters are required to be considered at the early stages of design if desired operational behaviours are to be realised. A system design and development requires appropriate and timely application of engineering and management efforts to meet the previously mentioned parameters. A system may serve its intended purpose most effectively when its technical and operating characteristics are engineered into the design. Therefore, operational feasibility is a critical aspect of systems engineering that needs to be an integral part of the early design phases

CHAPTER 4

Featuring and images

4.1 <u>Data Dictionary</u>

> **The heart of Africa's digital transformation.**

Africa Data Centers, part of the Liquid Intelligent Technologies Group, is the region's first and largest network of interconnected, carrier and cloud-neutral data facilities.

Choosing where to store your business-critical data is one of the most important decisions your company will make. Bringing global skills to local markets, we are your trusted partner for rapid and secure data services and interconnections across the African continent.

Africa Data Centers are designed, built and operated to the highest standards demanded by today's leading cloud providers, carriers and enterprises – providing your business with peace of mind, regardless of the scale of requirement.

Fig. 4.1 Data Center

> **A single network like no other**

Since putting our first fiber in the ground in 2009, our high-speed cross-border network has grown to over 100,000km of fiber. It is the continent's largest independently owned network, offering connectivity to all the main subsea cable systems that link Africa to the rest of the world.

We are also the first to establish a direct terrestrial communication link between Cape Town, South Africa, and Cairo, Egypt - stretching the entire length of the continent and offering improved latency.
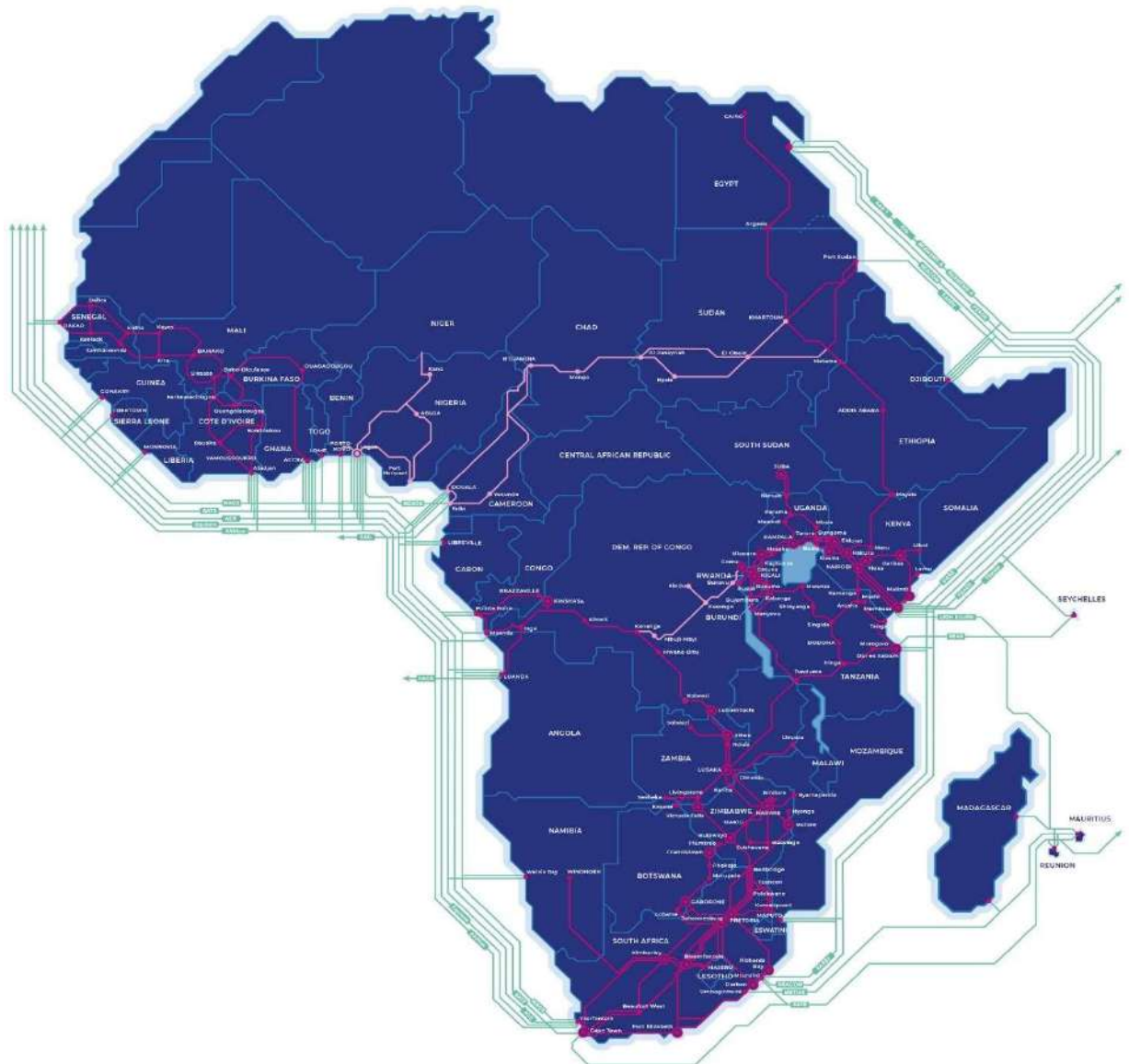
Fig. 4.2 Our Network

> **Our award-winning network immediately**

- Africa's largest independent fibre network, spanning over 100,000km.

- A reliable and highly protected, self-healing switched backbone that prioritises traffic within Africa to reduce latency.

- State-of-the-art data centres in Johannesburg, Cape Town, and Nairobi, with a combined potential 19,000 square metres of rack space and 78 MW of power

- Consortium member in SAT3/SAFE, WACS, TEAMS and Easy, as well as a large IRU inventory holder in SEACOM and a shareholder in WIOCC

- Onwards connectivity to major international hubs such as London and Marseille

> **Empowering Africa through excellence**

Choosing where to store your business-critical data is one of the most important decisions your company will make. By bringing global skills to local markets, we are your trusted partner for rapid and secure data center services and interconnections across the African continent.

Africa Data Centers are designed, built and operated to the highest standards demanded by today's leading cloud providers, carriers and enterprises – providing your business with peace-of-mind, regardless of the scale of requirement.

Our facilities are purpose-built and entirely owned and operated by us. This means the physical and digital security of your data and transactional computer processing remain front-of-mind from the physical layer up.

The Africa Data Centre's Advantage

Pan-African Footprint

Africa Data Centers are located across Africa's major regional business and trade hubs. These locations are rapidly emerging as epicenters for public and private cloud hosting, attracting both multinationals and the largest African enterprises.

Robust Security

The physical security of your data and transactional computer processing remains front-of-mind from the physical layer up. Onsite security is guaranteed by multiple layers. It is a combination of physical security, biometric

access control and CCTV systems. Africa Data Centers are ISO 27001 certified and PCI DSS compliant.

International Expertise

Africa Data Centers brings global skills and expertise to your local market. With an exceptionally experienced team you can rest assured that years of experience and knowledge has equipped our team to provide excellent support.

Carrier & Cloud Neutral

Africa Data Centers is the primary choice for international cloud and content providers. This ensures that our facilities are equipped no matter what network or cloud onramp your business requires.

Operational Excellence

Africa Data Centers are designed, built and operated to the highest standards demanded by today's leading cloud providers, carriers and enterprises – providing your business with peace-of-mind, regardless of the scale of requirement.

- **Interconnected**

Africa Data Centers is Africa's largest network of interconnected carrier- and cloud-neutral data facilities. Over 50 leading carriers call Africa Data Centers their home, as do major internet exchanges, including the Johannesburg Internet Exchange (JINX), Cape Town Internet Exchange (CINX) and Kenya Internet Exchange Point (KIXP).

4.2 DIAGRAM
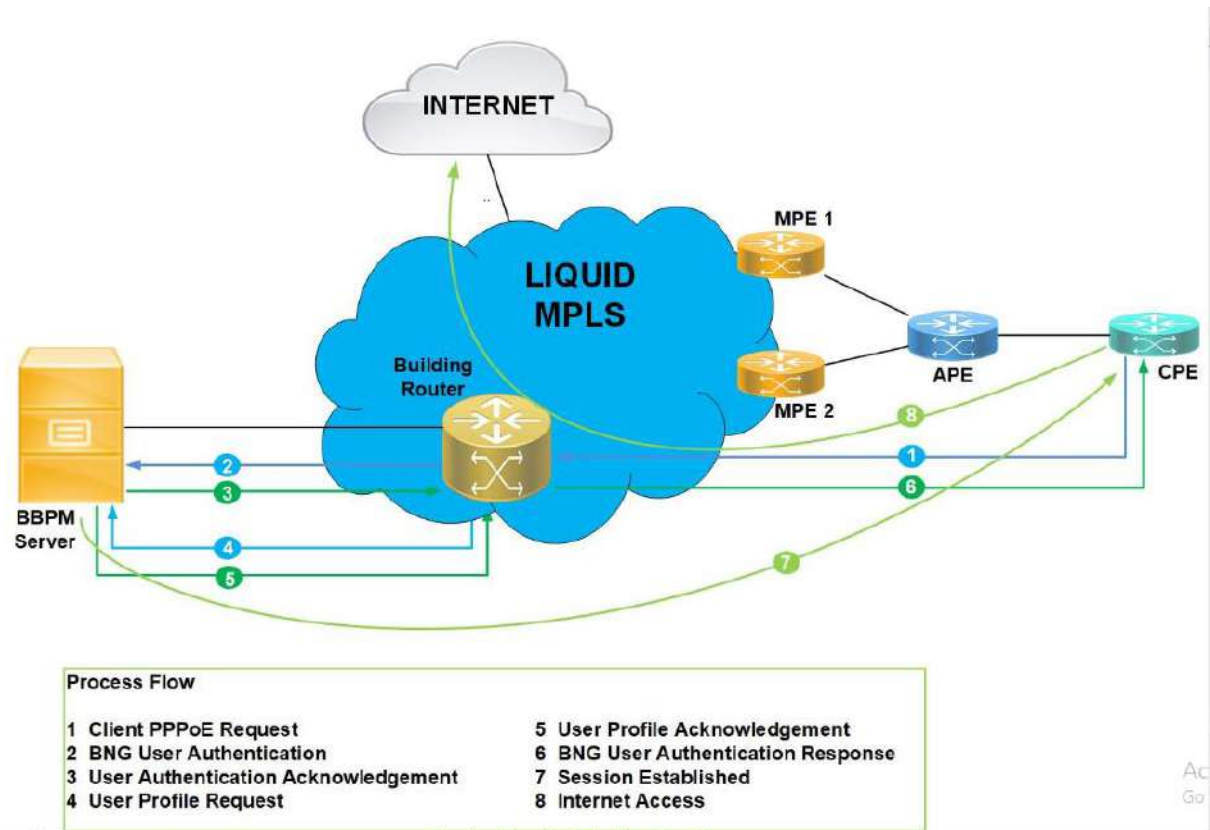
Fig. 4.3 Liquid Architeucure Diagram

4.3 <u>DFD</u>
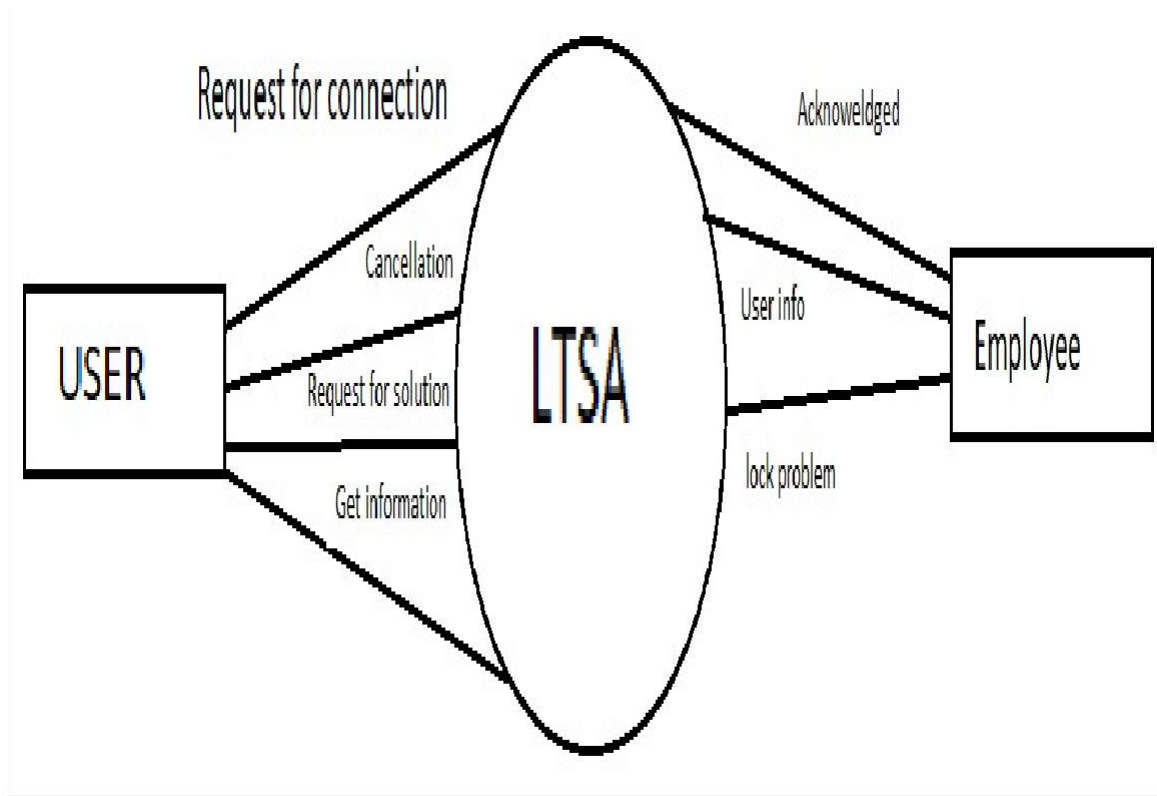
Fig. 4.4 DFD

4.4 <u>Customer information</u>

    1. This is for store the information of CPE information to get the addresses of devices.

CPE 1 Information		
LME WAN Link	NA	LME LAN GW
LME Management IP	10.101.55.8	CE IP Range
Public NW Address	41.169.164.88	CPE Hostname
Mask	255.255.255.248	Serial No.
CPE CRAMER NAME	GCNBSTONE62301D	CPE Management VLAN
CPE Management IPAddress	10.101.55.8	CPE WAN IPAddress
Software Port	null	

Table. 4.1 CPE

    2. This table to store the complete information of user.

|| Print || Close ||

Babylons Toren (Pty) Ltd_NeoInternet_195326_027FRAN1742013299261			
Planning Project No.	Babylons Toren (Pty) Ltd_NeoInternet_195326_027FRAN1742013299261	Service ID	027FRAN1742013299261
Customer Name	Babylons Toren (Pty) Ltd	Affected Region/s	WESTERN CAPE
Customer Contact	NA	Customer e-mail ID	NA
IP Planner	AJAY.ROHILLA_dis	Planning Date	2019-08-07 00:00:00.0
RF Planner	NA	SDM Ref (Rev Track ID)	195326
TX Planner	NA	OPICs Fiber Ref	CPE75331
Voice Planner	NA	Satellite Planner	NA
MW Project Ref			

Product Details					
Service Circuit Name	WCALWEJPM32001I_WBABTOONOxxx01C_NCxxxx_001_NEO (In Service)				
Product Name	Bandwidth	SLA	No of IP Address	No Of Channels	Trunk Group Name
NeoInternet	10 Mbps	Economy (99%)	16	NA	NA
Parent Service Type : Name : BW	NA : NA : NA				
LM Type (Primary)	IP Offnet		LM Type (Secondary)	NA	
Neotel Number Range	NA				
Ported Numbers	NA		Trigger Number	NA	
Toll Access Numbers	NA				

Table. 4.2 User information

4.5 L.T.S.A Design

Fig. 4.5 Design

CHAPTER 5

Frontend Design

5.1 <u>Input screenshot</u>

1> This screenshot for new case when the customer facing any type of problem then customer fill this form.

Fig. 5.1 New Cases

2> This screenshot for employee when customer fill detail and send to company then employee do the work of their request based on service id.

Fig. 5.2 Incident

On Boarding Process

After getting the Email ID created, Lead has to fill below Form for Other Tools Access Requests :

- Line Manager : Lindiwe Sibidi
- Permission Type : Permanent

Fig. 5.3 Onboarding process

5.2 <u>OUTPUT</u>

This screenshot is output for all information related to problem of customer and employee to get the status of problem.

Fig. 5.4 output

CHAPTER 6

Report

6.1 Report

This screenshot for get all the information of customer.

Babylons Toren (Pty) Ltd_NeoInternet_195326_027FRAN1742013299261			
Planning Project No.	Babylons Toren (Pty) Ltd_NeoInternet_195326_027FRAN1742013299261	Service ID	027FRAN1742013299261
Customer Name	Babylons Toren (Pty) Ltd	Affected Region/s	WESTERN CAPE
Customer Contact	NA	Customer e-mail ID	NA
IP Planner	AJAY.ROHILLA_dis	Planning Date	2019-08-07 00:00:00.0
RF Planner	NA	SDM Ref (Rev Track ID)	195326
TX Planner	NA	OPICs Fiber Ref	CPE75331
Voice Planner	NA	Satellite Planner	NA
MW Project Ref			

Product Details					
Service Circuit Name	WCALWEJPM32001I_WBABTOONOxxx01C_NCxxxx_001_NEO (In Service)				
Product Name	Bandwidth	SLA	No of IP Address	No Of Channels	Trunk Group Name
NeoInternet	10 Mbps	Economy (99%)	16	NA	NA
Parent Service Type : Name : BW	NA : NA : NA				
LM Type (Primary)	IP Offnet		LM Type (Secondary)	NA	
Neotel Number Range	NA				
Ported Numbers	NA		Trigger Number	NA	
Toll Access Numbers	NA				

Toll Access Numbers	NA		
Workorder Type	NA		
Analogue Channels	NA	BRI Channels	NA
SLV_password	NA	NeoVoice LNS Number	NA
Site A Offnet Circuit ID	CEL21-0001685	Site Z Offnet Circuit ID	No Offnet Involved
Offnet LM Provider Site A	Dark Fiber Africa	Offnet LM Provider Site Z	No Offnet Involved
Sec Site A Offnet Circuit ID	No Offnet Involved	Sec Site Z Offnet Circuit ID	No Offnet Involved
Sec Offnet LM Provider Site A	No Offnet Involved	Sec Offnet LM Provider Site B	No Offnet Involved
Billing Type	Standard		

Customer Site Details						
Station	Customer Address	Station Code	Alias	Last Mile Service	Interface	Interface Type
BABYLONS TOREN (PTY) LTD*1	Babylons Toren (Pty) Ltd,Babylons Toren - R45 Simondium Franschhoek Western Cape South Africa Latitude : -33.823381 Longitude : 18.926895 Pincode : 7670	WBABTOC001	NA	NA	hwPort[1](Gigabit Ethernet)	G.703(A-End),G.703(Z-End)

DEPENDENCIES & COMMENTS
NA

IP Service Configuration Information			
HSRP GW	NA	CIR (bps)	NA
HSRP Mask	NA	PIR (bps)	10240000
VRF	NA	Service VLAN	81.178_3300
Circuit ID	WGEAWE-WGEAWE-IWBABTO001		
CoS	COS1-NA,COS2-NA,COS3-10 Mbps,COS4-NA	Contention Ratio (Internet)	NeoInternet Standard 100%
Protocol	NA	EIGRP AS Number	NA

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Static LAN IP	NA	BGP	NO
OSPF	NA	AS Number	36937
Process ID	NA	Customer End IP Address	41.164.149.50/28
Area ID	NA	Neotel End Loopback(for ILL)	NA
Multihoming/Load Sharing/Backup(for ILL)	NA	NI /Extranet Configuration Route Target	NA
Neighbour IP	NA	Remote AS Number	NA
Routes to be announced to customer (for ILL)		NA	
Customer routes to be received		NA	
Customer LAN IP		NA	
Primary Public Peering Subnet	NA	Secondary Public Peering Subnet	NA
Primary Private Peering Subnet	NA	Secondary Private Peering Subnet	NA
Advertised Public Prefixes	NA	OPCO MTU	NA
VCID	NA	Skey	NA
BGP Details	NA		

IGW/ IPE Information			
IGW/ IPE Site	BELVILLE POP	IP Address	172.16.80.3
IGW/ IPE Name	WCALWEJPM32001I (wble01jpm32001i)	Port for L3 Subinterface	NA
IGW/IPE Subinterface IP Address	NA	Vlan Id	NA
BGP peering IP address at neotel side	NA	BGP peering IP address at customer side	NA
Port for L2 Subinterface	NA		

APE 1 Information (Aend)			
APE Name	WGEAWEC9006x01A	APE HostName	wtgw01c9006x01a_172.16.81.178_172.16.17.178
APE Location	TERACO POP*1	Port Subinterface	NA
APE Port	Te0/1/0/1	Interface VLAN	NA
VRF	NA	Interface Vlan IP address	NA

RD	NA	RT Import	NA
RT Export	NA	Interface Vlan PW Config	

Service Instance for Service		
Service Instance	NA	
Description	NA	
Encapsulation	NA	NA
Rewrite Command	NA	
SI PW Config	NA	
Bridge Domain	NA	

Service Instance for BS Mgmt / CPE Mgmt	
Service Instance	NA
Encapsulation	NA
Rewrite Command	NA
Bridge Domain	NA

ASR Additional Information	
PSI and Phy Port	NA interface GigabitEthernet101/0/0/0.503 interface GigabitEthernet101/0/0/0.503 description 027FRAN1742013299261/CUST/Babylons Toren (Pty) Ltd/BABYLONS TOREN (PTY) LTD*1/NeoInternet/10 Mbps/81.178/17.178/81.178 interface GigabitEthernet101/0/0/0.503 encapsulation dot1q 434 interface GigabitEthernet101/0/0/0.503 mtu 4484 interface GigabitEthernet101/0/0/0.503 vrf NA interface GigabitEthernet101/0/0/0.503 ipv4 address NA NA interface GigabitEthernet101/0/0/0.503 ipv4 unreachables disable
BG & BD/X-Connect	NA
BVI	NA

Activate Windows
Go to Settings to activate Windows.

SAT Panel 1 Information (Aend)			
AS Site Name	TERACO POP*1	AS Cramer Name	WGEAWEC9000V01A
AS Hostname	wtgw01c9006x01a	AS Topology (Ring)	null
AS Management IP	101.16.81.178, 101.16.17.178		
AS Port (LM NNI)	GigabitEthernet101/0/0/0(Gigabit Ethernet)		

BS 1 Information (Aend)			
BS Site Name	BABYLONS TOREN (PTY) LTD*1	BS Cramer Name	WBABTOONE62301B
BS Hostname	wbabtoone62301b	Serial No.	T1815TDRE43446179
BS Port (NNI)	ethernet2(Gigabit Ethernet)	BS Port (UNI)	hwPort[1](Gigabit Ethernet)
BS Management IP	172.30.134.161	Software Port(UNI)	eth1 swPort_1
BS Management VLAN	81.178_434		

APE AS VLAN Configuration (Aend)								
Aend HostName	Aend IP Address	Aend Port	VLAN Allowed	LM Details	Zend HostName	Zend IP Address	Zend Port
wtgw01c9006x01a_172.16.81.178_172.16.17.178	NA	Te0/1/0/1	WGEAWEC9006x01A_WGEAWEC9000V01A_VT1Gxx_001_NEO	Fiber	wtgw01c9006x01a_101.16.17.178	101.16.81.178,101.16.17.178	GigabitEtherne

CPE 1 Information			
LME WAN Link	Only for Neo Broadband	LME LAN GW	41.164.149.49
LME Management IP	Only for Neo Broadband	CE IP Range	41.164.149.52-41.164.149.62
Public NW Address	Only for Neo Broadband	CPE Hostname	wbabtoonoxxx01c_
Mask	255.255.255.240	Serial No.	NA
CPE CRAMER NAME	WBABTOONOxxx01C	CPE Management VLAN	NA
CPE Management IPAddress	NA	CPE WAN IPAddress	41.164.149.50/28
Software Port	NA	MAC ID	NA

Bridging Details			
Link	WGEAWEC9000V01A_WGEAWEONOxxx02N_COP_001(In Service)		
Circuit	WGEAWEC9000V01A_WGEAWEONOxxx02N_VT1Gxx_001_NEO		
	A-End		Z-End
Location	TERACO POP*1	Location	TERACO POP*1
Device Name	WGEAWEC9000V01A(wtgw01c9006x01a_101.16.17.178)	Device Name	WGEAWEONOxxx02N(WGEAWEONOxxx02N_16.13.12.16)
Port	GigabitEthernet101/0/0/0(Gigabit Ethernet)	Port	WGEAWEONOxxx02N_Port_638435(Generic Port)
Card/Slot	GLC-T/Slot0	Card/Slot	NA

Link	WBABTOONE62301B_WBABTOONOxxx01C_COP_001(In Service)		
Circuit	WBABTOONE62301B_WBABTOONOxxx01C_VT1Gxx_001_NEO		
	A-End		Z-End
Location	BABYLONS TOREN (PTY) LTD*1	Location	BABYLONS TOREN (PTY) LTD*1
Device Name	WBABTOONE62301B(wbabtoone62301b_172.30.134.161)	Device Name	WBABTOONOxxx01C(wbabtoonoxxx01c_)
Port	hwPort[1](Gigabit Ethernet)	Port	WBABTOONOxxx01C_port_1(Generic Port)
Card/Slot	NA	Card/Slot	NA

Link	WGEAWEONOxxx02N_WBABTOONE62301B_COP_001(In Service)		
Circuit	WGEAWEONOxxx02N_WBABTOONE62301B_VT1Gxx_001_NEO		
	A-End		Z-End
Location	TERACO POP*1	Location	BABYLONS TOREN (PTY) LTD*1
Device Name	WGEAWEONOxxx02N(WGEAWEONOxxx02N_16.13.12.16)	Device Name	WBABTOONE62301B(wbabtoone62301b_172.30.134.161)
Port	WGEAWEONOxxx02N_port_16(Generic Port)	Port	ethernet2(Gigabit Ethernet)
Card/Slot	NA	Card/Slot	NA

Fig. 6.1 customer information

CHAPTER 7

TESTING

7.1 Testing / Troubleshooting Screenshot

Connectivity testing

- 41.171.0.1
- show route vrf internet CPE ip
- details sh route vrf internet 41.169.140.73
- show subscriber session filter ipv4-address 41.169.140.73
- detail ping vrf internet 41.169.140.73
- to check link status show interfaces gi109/2/2

```
Microsoft Windows [Version 10.0.19042.1052]
(c) Microsoft Corporation. All rights reserved.

C:\Users\ajay.panchal>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=81ms TTL=111
Reply from 8.8.8.8: bytes=32 time=35ms TTL=111
Reply from 8.8.8.8: bytes=32 time=37ms TTL=111
Reply from 8.8.8.8: bytes=32 time=39ms TTL=111

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 35ms, Maximum = 81ms, Average = 48ms

C:\Users\ajay.panchal>_
```

Command Prompt

```
ipconfig      Display network configuration for each network adapter
ipvfconfig    Display network configuration for each network adapter
netsh
netstat       Displays protocol statistics and current TCP/IP network
              connections
nslookup      DNS Lookup
ping          Send echo messages
quit          Exit Telnet/SSH
snmpget       SNMP GET
snmpgetbulk   SNMP GET BULK
snmpset       SNMP SET
ssh           ssh client
telnet        Telnet client
tracert       Trace route to destination
PC>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time=6ms TTL=128
Reply from 10.0.0.2: bytes=32 time=15ms TTL=128
Reply from 10.0.0.2: bytes=32 time=4ms TTL=128
Reply from 10.0.0.2: bytes=32 time=11ms TTL=128

Ping statistics for 10.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 16ms, Average = 9ms

PC>
```

	A	B	C	D	E
JUMP SERVER IP	172.27.63.70	IP starts with 41..series lies under jump server		
	ssh -l ajay.verma 172.16.66.144			
cammand		ip ki jagah pe jo ip login karna hai vo		
Route	Cammand	Remark		
IP Radio /offnet k case mai	FST ko Copper script deni hoti hai			
only IP k case mai	fiber script deni hoti hai			
BNG to CPE	ping routing-instance internet 41.162.92.113 rapid count 200 size 1400	To check ping test	juniper	if VRF not prese
after login JUMP server	ssh -l paplu.khound 41.171.0.6	(ip isme jo use ki hai vo ip nhi ID hai jo hume BNG login kr k milegi)		
Only in Juniper router	ping vrf internet 41.162.109.17 repeat 100	by this cammand we check ping packet	juniper	if VRF present
for version	Sh version	in up		
	show logging	in 102/0/0/21	for checking logs		
To check L2 path	show l2vpn atom-db neighbor 172.16.81.56 circuit-id 1273	neighbour matlb dusre end ki ip and circuit (circuit id show running formal se milega pw-id ko circuit id		
0/2	Downlink/port from UNI	connect to customer end ,		
0/3	uplink//port from NNI	connect to core end		
	sh route 41.160.99.145 table internet.inet detail	this command we will run in juniper BNG and to get BNG cisco router	cisco	BNG
To check PPPOE session	sh subscriber session filter ipv4 41.160.99.145	To check PPPOE session activated or not, CPE ip used	to check session	BNG
	show bridge-domain 195	we can get all mac in brige domain		
	show mac-address-table	i 3d77	will get mac,port detail		
fiber	dispatch osp			
in2it@gnst01jmx48001z-re1>	show route table internet.inet.0 41.169.167.57 detail	to check Orignate ip where we get BNG ip,cust ip		
IP	dispacth ISP			
Agar web report mai BNG ki IP :-65.32 hai or Teraco data center k through aapko 65.45 ip aa rhi hai it means Juniper BNG se customer Cisco BNG mai chala gaya hai ab cisco wala abhi active nahi hai				
	show l2vpn forwarding bridge-domain mac-address location 0/0/cPU0	To check with mac address ki kis port mai jaara hai		

```
Routing entry for 41.160.168.152/32
   Known via "bgp 36937", distance 200, metric 0, type internal
   Installed Dec 10 14:40:37.639 for 00:53:06
   Routing Descriptor Blocks
     41.171.0.2, from 172.16.65.8
       Nexthop in vrf: "default", Table: "default", IPv4 Unicast, Table Id: 0xe0000000
       Route metric is 0
   No advertising protos.
RP/0/RSP1/CPU0:gtdc01c9006x01a#
RP/0/RSP1/CPU0:gtdc01c9006x01a#show route vrf internet 41.169.164.89
Tue Dec 10 15:33:52.746 UTC

Routing entry for 41.160.0.0/12
   Known via "bgp 36937", distance 200, metric 0, type internal
   Installed Oct 25 14:55:46.582 for 6w4d
   Routing Descriptor Blocks
     172.16.65.45, from 172.16.65.8
       Nexthop in vrf: "default", Table: "default", IPv4 Unicast, Table Id: 0xe0000000
       Route metric is 0
   No advertising protos.
RP/0/RSP1/CPU0:gtdc01c9006x01a#
```

```
ghsc01c920d01a#show interfaces description
Interface              Status        Protocol  Description
Gi0/0/0                down          down      >>>LINK_TO_G324CRZh426A01D_10.101.55.4
Gi0/0/1                down          down      >>>LINK_TO_G324CRONOxxx07C_10.101.55.5 <<<<
Gi0/0/2                down          down      Link to CPE/OA1623/GBOKRDONE62301D/10.101.55.7/Fiber
Gi0/0/3                down          down      Link to CPE/OA1623/GCRASTONE62301D/10.101.55.6/Fiber
Gi0/0/4                down          down      >>LINK_TO_GCNBSTZh426A01D_10.101.55.8 }<<
Gi0/0/5                down          down      027HONE1252012894629/CUST/Eco Tech converge/ECO TECH CONV
Gi0/0/6                down          down
Gi0/0/7                up            up
Gi0/0/8                down          down      >> LINK_TO_GCRASTZh426A05D_10.101.55.11 >>>
Gi0/0/9                down          down
Gi0/0/10               down          down      027RAND1252013064052/CUST/CPS Technologies (Pty) Ltd/CPS
Gi0/0/11               down          down      >>.LINK_TO_BS_qblo11one62301b_172.30.13.198@eth2<<<
Gi0/0/12               down          down      Link to BS/OA1623/G5BOSBONE62301D_10.101.55.24/Eth2
Gi0/0/13               down          down      027JOHA1252012001359/CUST/Internet Solutions, A Division
Gs/4.151
Gi0/0/14               up            up        <<Link to gknpstone62302b_172.30.13.64>>
Gi0/0/15               up            up
```

CPE 1 Information		
LME WAN Link	NA	LME LAN GW
LME Management IP	10.101.55.8	CE IP Range
Public NW Address	41.169.164.88	CPE Hostname
Mask	255.255.255.248	Serial No.
CPE CRAMER NAME	GCNBSTONE62301D	CPE Management VLAN
CPE Management IPAddress	10.101.55.8	CPE WAN IPAddress
Software Port	null	

```
ghsc01c920d01a#show int
ghsc01c920d01a#show interfaces Gi0/0/4
GigabitEthernet0/0/4 is down, line protocol is down
   Hardware is 24xGE-4x10GE-FIXED-S, address is 707d.b974.5d04 (bia 707d.b974.
   Description: >>LINK_TO_GCNBSTZh426A01D_10.101.55.8 <<<
   MTU 4470 bytes, BW 1000000 Kbit/sec, DLY 10 usec,
      reliability 255/255, txload 1/255, rxload 1/255
   Encapsulation ARPA, loopback not set
   Keepalive set (10 sec)
   Full Duplex, 1000Mbps, link type is auto, media type is BX10D
   output flow-control is unsupported, input flow-control is on
   ARP type: ARPA, ARP Timeout 04:00:00
   Last input never, output never, output hang never
   Last clearing of "show interface" counters never
   Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 91460
   Queueing strategy: fifo
   Output queue: 0/40 (size/max)
   5 minute input rate 0 bits/sec, 0 packets/sec
   5 minute output rate 0 bits/sec, 0 packets/sec
      1311449160 packets input, 547424065786 bytes, 0 no buffer
      Received 1656987 broadcasts (0 IP multicasts)
      0 runts, 0 giants, 0 throttles
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
      0 watchdog, 34 multicast, 0 pause input
      1286771554 packets output, 1188481639865 bytes, 0 underruns
      0 output errors, 0 collisions, 3 interface resets
      0 unknown protocol drops
      0 babbles, 0 late collision, 0 deferred
      0 lost carrier, 0 no carrier, 0 pause output
      0 output buffer failures, 0 output buffers swapped out
ghsc01c920d01a#
ghsc01c920d01a#sho
```

```
gswd01c9224d05a#show  interfaces Gi0/0/21 tr
gswd01c9224d05a#show  interfaces Gi0/0/21 transceiver det
gswd01c9224d05a#show  interfaces Gi0/0/21 transceiver detail
ITU channel not available (1310.0 nm),
Transceiver is externally calibrated.
ma: milliamperes, dBm: decibels (milliwatts), NA or N/A: not applicable.
++ : high alarm, + : high warning, - : low warning, -- : low alarm.
A2D readouts (if they differ), are reported in parentheses.
The threshold values are calibrated.
```

		High Alarm	High Warn	Low Warn	Low Alarm
	Temperature	Threshold	Threshold	Threshold	Threshold
Port	(Celsius)	(Celsius)	(Celsius)	(Celsius)	(Celsius)
Gi0/0/21	46.0	90.0	85.0	-40.0	-45.0
	Voltage	High Alarm Threshold	High Warn Threshold	Low Warn Threshold	Low Alarm Threshold
Port	(Volts)	(Volts)	(Volts)	(Volts)	(Volts)
Gi0/0/21	3.23	3.63	3.46	3.13	2.97
	Current	High Alarm Threshold	High Warn Threshold	Low Warn Threshold	Low Alarm Threshold
Port	(milliamperes)	(mA)	(mA)	(mA)	(mA)
Gi0/0/21	22.7	100.0	80.0	4.0	2.0
	Optical Transmit Power	High Alarm Threshold	High Warn Threshold	Low Warn Threshold	Low Alarm Threshold
Port	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
Gi0/0/21	-5.7	-2.2			-9.9

```
   Port: 23
   Xcvr Type: SFP
   Vendor Name: OEM
   Vendor Serial Number: F20GD882
   CLEI Code:
   Part Number:
   Product Id:
   Thresholds:
                       Alarm High           Warning High          Warning Low           Alarm Low
      Temperature:        85C                  75c                   0C                    -5C
      Voltage:          3570mv               3470mv                3150mv                3130mv
      Bias:             90mAmps              80mAmps               4mAmps                2mAmps
      Transmit Power:  0.63100 mw (-1.99971 dBm)  0.50100 mw (-3.00162 dBm)  0.12500 mw (-9.03090 dBm)  0.10000 mw (-10.00000 dBm
      Receive Power:   0.63100 mw (-1.99971 dBm)  0.50100 mw (-3.00162 dBm)  0.00700 mw (-21.54902 dBm)  0.00600 mw (-22.21849 dB
   Temperature: 44 C
   Voltage: 3300 mV
   Bias: 21 mAmps
   TX Power:  0.25700 mw (-5.90067 dBm)
   RX Power:  0.000 mw (<-40.00 dBm)
RP/0/RSP0/CPU0:ktbs01c9001x01a#show interfaces Gi101/0/0/23
Tue Dec 10 17:06:34.848 SAST
GigabitEthernet101/0/0/23 is down, line protocol is down
   Interface state transitions: 152
   Hardware is GigabitEthernet/IEEE 802.3 interface(s), address is 78ba.f9e8.9bfc (bia 78ba.f9e8.9bfc)
   Internet address is Unknown
   MTU 1514 bytes, BW 1000000 Kbit (Max: 1000000 Kbit)
      reliability 255/255, txload 0/255, rxload 0/255
   Encapsulation ARPA,
   Full-duplex, 1000Mb/s, link type is force-up
   output flow control is off, input flow control is off
   Carrier delay (up) is 100 msec, Carrier delay (down) is 100 msec
   loopback not set,
   Last link flapped 16:13:26
   Last input 16:13:13, output 16:13:13
   Last clearing of "show interface" counters 8w5d
   5 minute input rate 0 bits/sec, 0 packets/sec
   5 minute output rate 0 bits/sec, 0 packets/sec
```

Fig. 7.1 testing on cmd

CHAPTER 8

Limitation

Link down secnerio

1. We are always checking that we are getting MAC at SBC or not

2. if We are Not getting MAC at SBC then Firstly ,will check CPE Device(Zhone /OA)

3. MAC Not learning at SBC - check Port at Zhone /OA)

4. PABX Device is present on Customer end ,if any issue comes on PABX then customer needs to check .

5. AS Port down , then need to align Fiber FST .

6. May be at AS configuration issue .

7. In SBC ,will configure IP's

8. If we are not getting any MAC on SBC and there is no issue at AS then will align IP FST with spare and will do rest troubleshooting

PABX

A PABX, or private automatic branch exchange, is a type of PBX that is automated.

The term PABX was created for modern automated systems, while PMBX -- private

A private branch exchange (PBX) is a telephone system within an enterprise that switches

calls between users on local lines, while enabling all users to share a certain number of

 external phone lines. In contrast to a public switched telephone network(PSTN) the main

 purpose of a PBX is to save the cost of requiring a line for each user to the telephone

Features of PBX

1 telephone trunk (multiple phone) lines that terminate at the PBX;
   computer with memory that manages the switching of the calls within the PBX and in
2 and
3 network of lines within the PBX;

4 unified communications (UC) router -- wireless and wired;

5 phone handset -- Universal Serial Bus (USB), VoIP and Session Initiation Protocol

6 VoIP

7 IP PBX;

SIP

The session initiation protocol (SIP), a popular internet telephony protocol, forms the foundation of all types of internet communication sessions. It establishes sessions, manages signaling, and terminates the connection when the sessions end.

PRI

The Primary Rate Interface (**PRI**) is a telecommunications interface standard used on an Integrated Services Digital Network (ISDN) for carrying multiple DS0 voice and data transmissions between the network and a user. **PRI** is the standard for providing telecommunication services to enterprises and offices.

The primary objective of this chapter is to obtain an appreciation for the composition of the TCP/IP protocol suite. We first examine the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) Reference Model, which was briefly mentioned in para 8. Although the TCP/IP protocol suite predates the ISO's Reference Model, by examining the layering concept associated with communications defined by that model we can obtain a better appreciation for the functioning of the TCP/IP protocol suite. Let's examine the ISO Reference Model.
With the emerging applications and needs of ever-increasing bandwidth, it is anticipated that the next-generation broadband passive optical network with much higher bandwidth is a natural path forward to satisfy these demands. For network operators, it is therefore interesting and protable to develop this scenario of valuable access networks. Broadband passive optical networks utilize the optical transmission medium, and for increasing transmission rates of broadband applications and services, it is necessary to characterize and investigate some specic features of new optical signal processing techniques at the signal transmission. Furthermore, there also exist various architectures and optical infrastructures for possible developing of broadband passive optical networks. Also in this case, they must be specied with emphasis on their characteristics and possible implementations in real access networks.

8.1 <u>Future Enhancement</u>

- **<u>Networking</u>**

   In technology, 'networking' is connecting a system of computers to share information. The Internet is just that type of service, and new ideas and better systems are being developed every day. We can define the Internet as a 'cloud' or repository for files and services that we can access, but that are not on our computers directly.

   Technology is advancing every day. Ten years ago, nobody would have imagined that you could start your car from your phone, or your refrigerator could order food from Amazon! While we can't tell you, what is going to happen tomorrow, let alone 5 years from now, we can use existing technology and trends to predict possibilities of the future.

- **<u>Fi 6 and Wi-Fi 7</u>**

   Wi-Fi 6 is faster Internet, up to 9.6 Gbps (consider that Wi-Fi 5 is 3.5 Gbps!). However, Wi-Fi 6 not only addresses speed, but it helps manage multiple devices connected to a network. This is critical because so many of us are working from home, streaming movies/TV, and posting updates to social media on our hand-held devices. Plus, our furnaces, refrigerators, microwaves, and stoves are also connected to the Internet. As such, there is a need for something to handle all that increased demand.

   Where today's routers can easily become overwhelmed with so many connected devices, Wi-Fi 6 routers can handle the load and distribute the speed. You may not get a huge boost on all the devices, but you won't see such rapid degradation in speed and response. That is the benefit of technology. There will only be more and more devices connected to networks: a better management tool is needed, and the future is Wi-Fi 6, and even **Wi-Fi 7** is looming on the horizon!

   Wi-Fi 7 is 802.11be, the latest standard. While this functionality is still a bit further out, it has some increased capabilities over Wi-Fi 6. It can send data on several frequencies simultaneously, use two bands (or even three) at once, and it further increases the information it can send over the network.

- **<u>5G</u>**

   5G is a rage today, with wireless carriers touting their prowess in this realm. There's 5G and ultra-wide 5G in larger cities. This promises more coverage at much

BNG

Broadband Network Gateway (BNG) is the access point for subscribers, through which they connect to the broadband network. When a connection is established between BNG and CustomerPremise Equipment (CPE), the subscriber can access the broadband services provided by the Network Service Provide (NSP) or Internet Service Provider (ISP). BNG establishes and manages subscriber sessions. When a session is active, BNG aggregates traffic from various subscriber sessions from an access network, and routes it to the network of the service provider. BNG is deployed by the service provider and is present at the first aggregation point in the network, such as the edge router. An edge router, like the Cisco ASR 9000 Series Router, needs to be configured to act as the

BNG Architecture

Figure 1: BNG Architecture
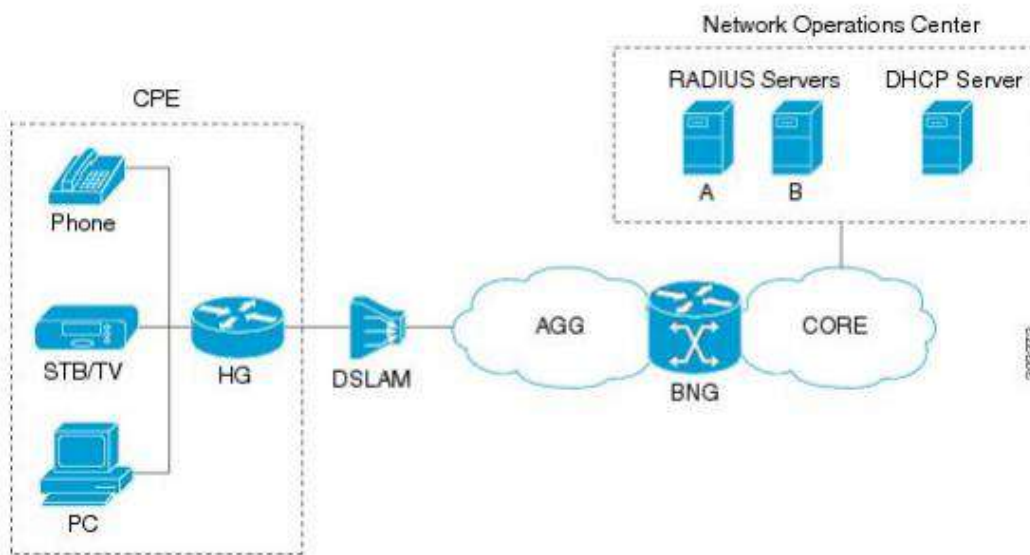
The BNG architecture is designed to perform these tasks:

• Connecting with the Customer Premise Equipment (CPE) that needs to be served broadband services.

BNG design

CHAPTER 9

CONCLUSION

A direct application of generic machine learning packages does not adequately highlight these critical performance regions or provide as precise confidence estimates. Those that take inspiration from nature for the development of novel problem solving techniques and Those that employ natural materials to compute or communicate.

Telecommunication has seen exponential growth over the past few years, especially amid the Covid-19 pandemic. Its huge impact on every aspect of human life has not only made it easier for family and friends to be in touch, but also helped business by means of communication and security..

This is the perfect solution for long-distance family and friends thanks to online phone calls, text messages, e-mails or social media. Telecommunication is also the momentum to push the development of social media. More and more people around the world now have access to some sources of entertainment to watch news, movies and music.

Why Telecommunication Is Important to Us:

1.It satisfies our basic need to connect and communicate, as this has become the foundation for governments, business, communities and families.
2. From natural disaster initiatives to military needs, telecommunication is vital for security.
3. It's the biggest economic booster. According to Statista, the telecom sector accounts for an estimated global spend of $520 billion annually.
4.Telecommunication provides an opportunity to encourage education, either a quick search on the Internet or tutorial on any subject.

Telecommunication is an inevitable movement since the beginning of the 21st century. It's better for not only businesses but also every individual to take advantage of these technology developments. Follow ConnectPOS to catch up with more hot trends in the technology and retail world!

The history and challenges of wireless communications, as outlined in previous chapters, suggest a variety of strategies that could be pursued to fulfill the vision for untethered military communications systems. This chapter summarizes and integrates key points made in the preceding chapters to provide a set of 12 recommendations directed to the DOD and DARPA. Organizational changes are recommended that would provide an environment conducive to the development and military application of state-of-the-art commercial technology. To meet defense-unique needs, specialized R&D and demonstration efforts are recommended that focus on various aspects of wireless technology, from the highest network level down to individual components.

Voracious consumer demand is stimulating many advances in commercial wireless communications technology, particularly cellular and cordless telephones. The portfolio of wireless services now available in the commercial marketplace includes a wide range of telephony, paging, and data applications delivered over a variety of service offerings ranging from land mobile radio to cellular to satellite communications. Each service offers a unique combination of coverage region, bandwidth, subscriber equipment properties, and connectivity. In the aggregate, commercial wireless capabilities are considerable, yet many technical challenges

CHAPTER 10

Gantt chart

<u>Gantt Chart</u>
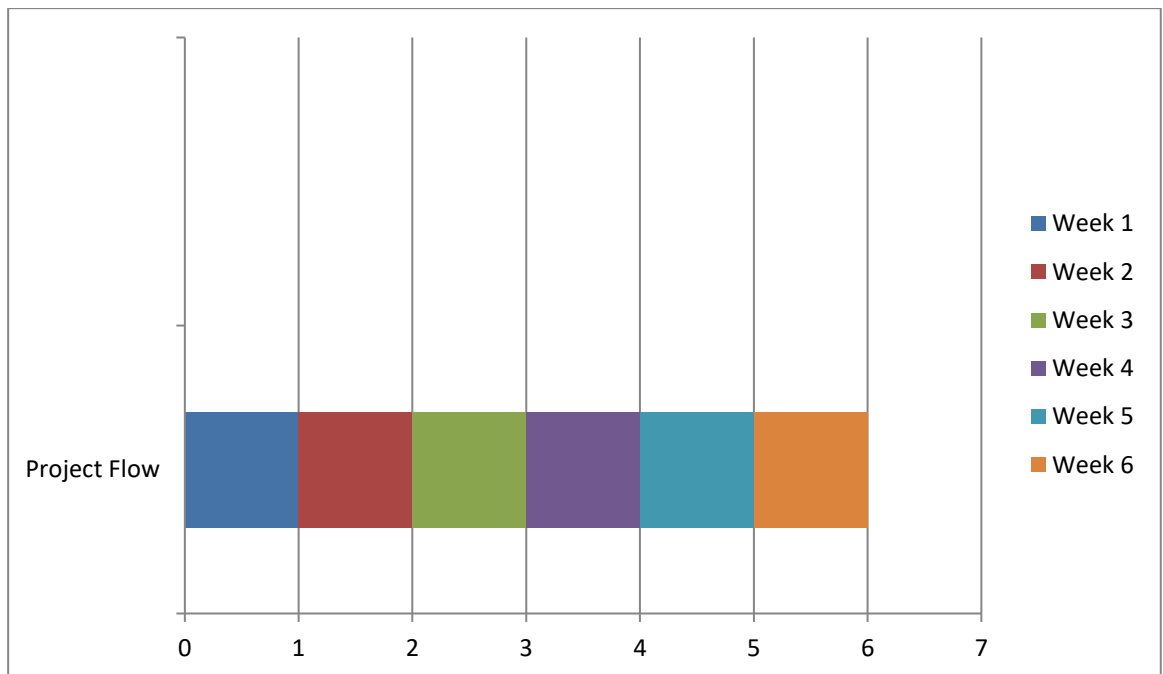
CHAPTER 11

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