

Industrial Training Report
A Thesis Submitted
In Partial Fulfilment of the Requirement
For the Degree of
MASTER OF COMPUTER APPLICATION

Submitted by

Ayushi Chauhan– (1900290149032)

Under the Supervision of

Prof. Ankit Verma

(Assistant Professor)

Department of Computer Applications,
KIET Group of Institutions,
Delhi-NCR, Ghaziabad



to the

Faculty of Computer Application
DR. APJ ABDUL KALAM TECHNICAL UNIVERSITY
LUCKNOW

(Formerly Uttar Pradesh Technical University, Lucknow)

June 2021

Declaration

I hereby declare that the work presented in this report entitled "LIQUID TELECOM SOUTH AFRICA", 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.

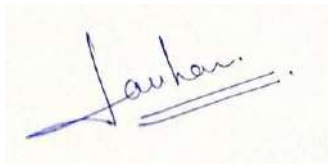
I have given due credit to the original authors/sources for all the words, ideas, diagrams, graphics, computer programs, experiments, results, that are not my original contribution. I have used quotation marks to identify verbatim sentences and given credit to the original authors/sources.

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.

Name : Ayushi Chauhan


Roll. No. : 1900290149032

Branch : MCA



(Candidate Signature)

Trainee Certificate



Alpha/Intern/2021/001
18th January 2021

Ayushi Chauhan
9/40, Sewa Nagar
Meerut Road
Ghaziabad

Dear Ayushi Chauhan,

We are pleased to appoint you as an Intern in Alpha Codes IT Solutions Pvt. Ltd. at **Noida** location from **04th Jan 2021** on the following terms and conditions:

1. You will be assigned a Manager under whose supervision you will work on the project assigned to you.
2. You shall complete your project in accordance with the requirements and guidance of the Manager of the Organization, and maintain qualitative standards as required.
3. Notwithstanding the fact that your engagement is internship, for your study purpose. It is expected of you to maintain the discipline, dignity, honor and goodwill of the Organization.
4. The arrangement is not that of an employer and an employee and as such you shall not be eligible to any allowances or other benefits as may be available to the employees of the Organization.
5. You will observe the rules & regulations and discipline of our office, and also maintain complete confidentiality and secrecy of the matters pertaining to our Office and/or any data that has been provided to you in the course of your project work.
6. On completion of your internship you will be required to submit to the talent team: a copy of your project, which will be the sole property of the Organization.
7. You will be entitled to get an internship completion certificate on submission of your project report.
8. There will be periodic review, both verbal and written, if you come up with the expectations in these evaluations, the company would be pleased to consider your career progression with us on your graduating from your course, for an exciting career opportunity with Alphacodes, which will be mutually beneficial.
9. In the event of any misconduct or breach of terms of this internship on the part of the Intern during the internship period; the Organization reserves the right to terminate this internship immediately without any notice.

For
Alphacodes IT Solutions Pvt. Ltd.

MANJEET KAUR
Manjeet Kaur
Associate Manager

Signature stamp of Manjeet Kaur
The following details are provided for your reference
Name: Manjeet Kaur
Designation: Associate Manager
Email: manjeet.kaur@alphacodes.com
Phone: +91 98961 23456
Address: Alpha Codes IT Solutions Pvt. Ltd., Artha Sez, Techzone IV Tower - 1, Greater Noida West, Uttar Pradesh - 201301

ALPHACODES IT SOLUTIONS PVT. LTD. Artha Sez, Techzone IV Tower - 1, Greater Noida West,
Uttar Pradesh - 201301

CERTIFICATE

Certified that AYUSHI CHAUHAN (Univ. Roll No.-1900290149032) have carried out the project work having “**Liquid Telecom**” for Master of Computer Application from Dr. A .P. J.Abdul Kalam Technical University (AKTU Technical University, Lucknow under my supervision. The project report embodies original work, and studies are carried out by the student himself/herself and the contents of the project 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/Institution.

Date:

Ayushi Chauhan (Univ. Roll No -1900290149032)

This is to certify that the above statement made by the candidate is correct to the best of our knowledge.

Mr. Ankit Verma

Assistant Professor

Department of Computer Application

KIET Group of Institutions, Ghaziabad

Signature of External Examiner

Signature of Internal Examiner

Dr. Ajay Kumar

Shrivastava Head,

Department of Computer

KIET Group of Institutions, Ghaziabad

Table of Contents

1. Introduction
2. Technologies / Software Requirements
3. Hardware requirement / Hardware Used
4. Featuring and Images
5. DFD
6. Gantt Chart (In terms of weeks)
7. Feasibility Study
8. Test Case
9. Conclusion
10. Literature Review
11. References

Introduction

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.

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

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.

Operators and users alike are seeing the benefits of the ir-reliable ,cost-effective,

Communications, infrastructure. Ten years ago, they set out to challenge the status quo.Today,they are changing the African telecoms industry, the lives of millions and even the continent itself. Liquid Telecom provides payment solutions to financial institutions and retailers,as well as award winning data storage and communication solutions to businesses across Africa and beyond.

Liquid Telecom started out by questioning the way things are done and being single-minded in their determination to improve them. Everything they do is driven by a simple yet powerful belief that everyone in Africa has the right to be connected. Over the last decade,

This vision has helped them change the face of communications in the region. Their future-focused approach to new product development makes their services enduringly adaptable. Their flexible and dynamic business model keeps them at the forefront of telecoms innovation. And by listening to customers, they ensure that their solutions are constantly evolving to meet their needs.

LIVE -PROJECT:

LIQUID TELECOM SOUTH AFRICA

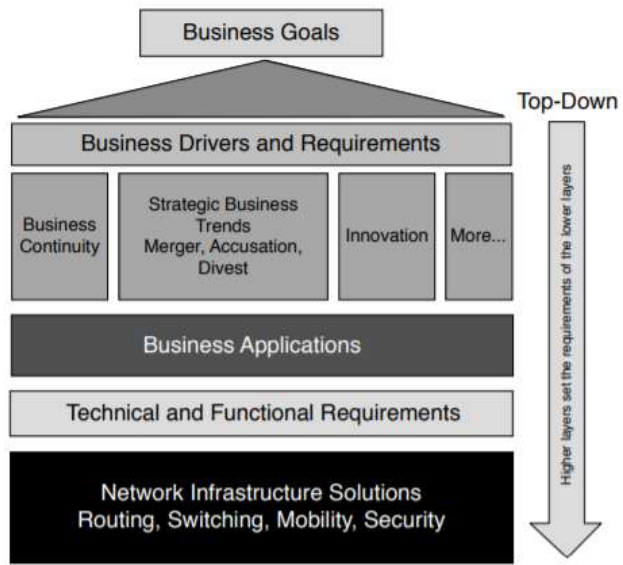


Business Requirements

This section covers the primary aspects that pertain to the business drivers, needs, and directions that (individually or collectively) can influence design decisions either directly or indirectly. The best place to start understanding the business's needs and requirements is by looking at the big picture of a company or business and understanding its goals, vision, and future directions. This can significantly help to steer the design to be more business driven. However, there can be various business drivers and requirements based on the business type and many other variables. As outlined in Figure 1-2, with a top-down design approach, it is almost always the requirements and drivers at higher layers (such as business and application requirements) that drive and set the requirements and directions for the lower layers. Therefore, network designers aiming to achieve a business-driven design must consider this when planning and producing a new network

design or when evaluating and optimizing an existing one.

The following sections discuss some of the business requirements and drivers at the higher layers and how each can influence design decisions at the lower layers.



Functional Requirements

Functional requirements compose the foundation of any system design because they define system and technology functions. Specifically, functional requirements identify what these technologies or systems will deliver to the business from a technological point of view. For example, a Multiprotocol Label Switching (MPLS)-enabled service provider might explicitly specify a functional requirement in a statement like this: “The provider edge routers must send VoIP traffic over 10G fiber link while data traffic is to be sent over the OC-48 link.” It is implied that this service provider network needs to have provider edge (PE) routers that support a mechanism capable of sending different types of traffic over different paths, such as MPLS Traffic Engineering (MPLS-TE).

Therefore, the functional requirements are sometimes referred to as *behavioral requirements* because they address what a system does.

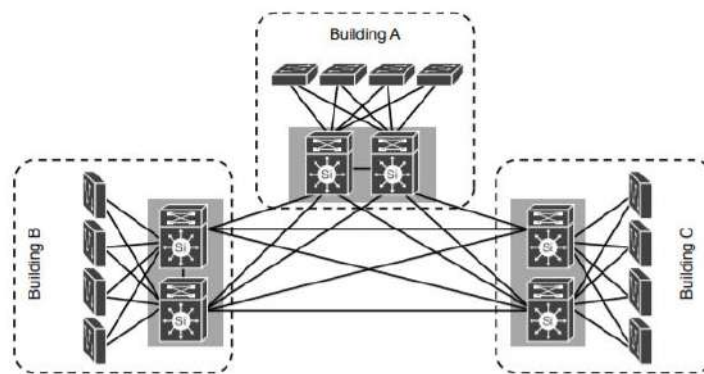


Figure 1-3 *Inflexible Design*

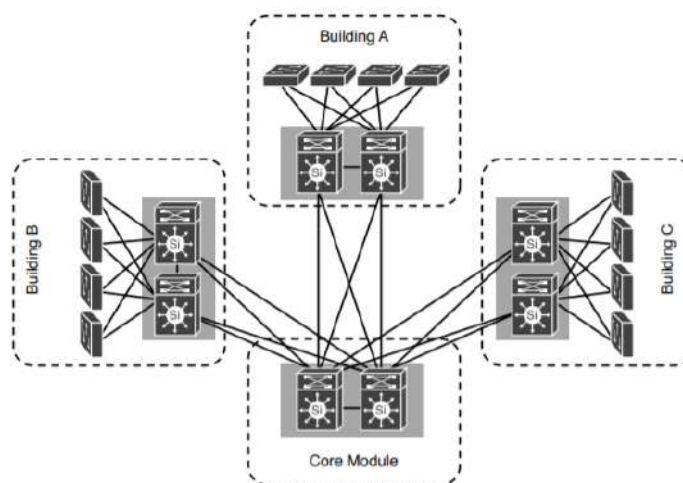


Figure 1-4 *Flexible Design*

Application Requirements

From a business point of view, user experience is one of the primary, if not the highest, priority that any IT and network design must satisfy.

The term *end users* can be understood differently according to the type of business.

The following are the most common categories of end users:

■ **Customers:** Customer can be individuals, such as a customer of a bank, or they can be a collective, such as the customers of an MPL service provider. From a business point of view, customer satisfaction can directly impact the business's reputation and revenue....

■ **Internal users:** In this category, the targeted users are internal users. Productivity of these users can translate to business performance efficiency, which has a direct relation to business success and revenue.

■ **Business partners:** Partners represent those entities or organizations that work together to achieve certain goals. Therefore, efficient interaction between partners can enhance their business success in the service of strategic goal achievement.

Therefore, a network or a technology that cannot deliver the desired level of the users' expectation (also known as *quality of experience*) means a failure to achieve either one of the primary business goals or failure to satisfy a primary influencer of business success. Consequently, networks and IT technologies will be seen by the business as a cost center rather than as a business enabler.

On this basis, networks design must take into account how to deliver the desired level of experience. In fact, what influences users' experience is what they see and use. In other words, from a user's perspective, the quality of experience with regard to applications and services used by different types of users is a key deterministic factor.

Deploying network applications or services without considering the characteristics and

network requirements of these applications will probably lead to a failure in meet-

ing business goals. For example, a company providing modern financial services wants to distinguish itself from other competitors by enabling video communication with

its customer service call center agents. If the network team did not properly consider video communication requirements as a network application, the application will probably fail to deliver the desired experience for the end users (customers in this example).

Consequently, this will lead to a failure in achieving the company's primary business goal. In other words, if any given application is not delivered with the desired quality of experience to the end users, the network can simply be considered as not doing its job.

Furthermore, in some situations, application requirements can drive functional requirements. For instance, if a service provider has a service level agreement (SLA) with its clients to deliver Voice over IP (VoIP) traffic with less than 150 ms of one-way delay and less than 1 percent of packet loss, here VoIP requirements act as application requirements, which will drive the functional requirements of the PE devices to use a technology that can deliver the SLA. This technology may include, for example, a Class-Based Tunnel Selection (CBTS) MPLS-TE protected with fast reroute (FRR) to send VoIP traffic over high-speed links and provide network path protection in case of a failure within 50 ms.



Technical Requirements

The technical requirements of a network can be understood as the technical aspects that a network infrastructure must provide in terms of security, availability, and integration. These requirements are often called *nonfunctional requirements*. Technical requirements vary, and they must be used to justify a technology selection. In addition, technical requirements are considered the most dynamic type of requirements compared to other requirements such as business requirements because, based on technology changes, they change often. Technical requirements include the following:

- Heightened levels of network availability (for example, using First Hop Redundancy Protocol [FHRP])
- Support the integration with network tools and services (for example, NetFlow Collector, or authentication and authorization system “RADIUS servers”)
- Cater for network infrastructure security techniques (for example, control plane protection mechanisms or infrastructure access control lists [iACLs])

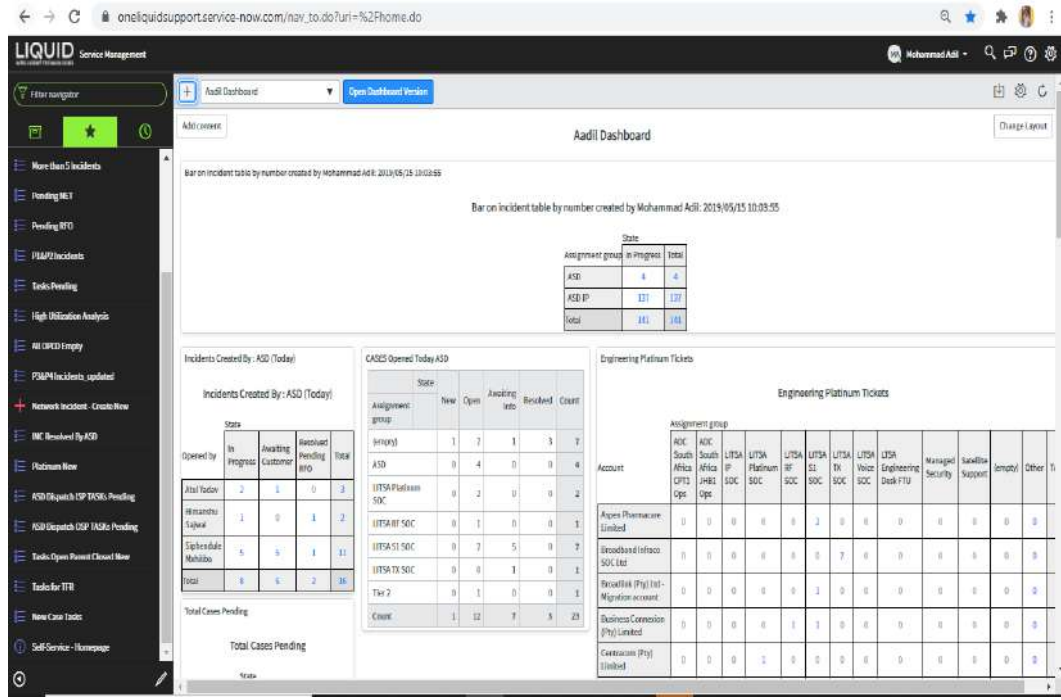
Hardware requirement / Hardware Used

- Windows Version- Windows.
- 2 GB Ram
- 1MB Cache Memory
- External Memory 10 GB

Tools

1. Service Snow.
2. 360 Degree view,
3. Dalo Radius .
4. Crammer Web report
5. InfoVista

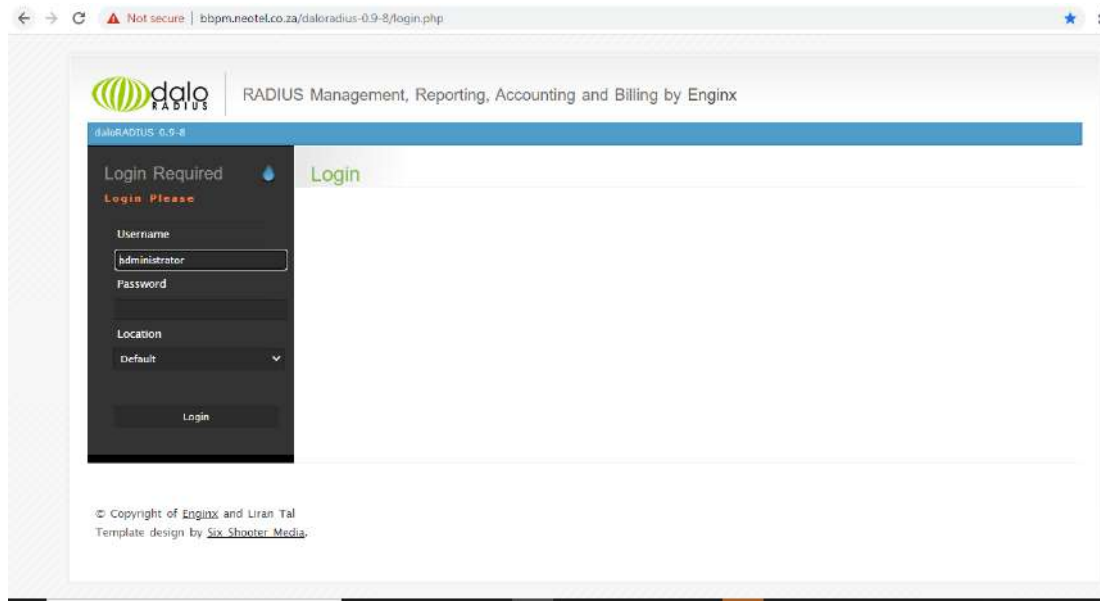
1. Service Snow



2. 360 degree view

The screenshot shows the 'Enterprise Customer 360 degree View' form. It has a header bar with the title. Below the header, there is a form area with two input fields: 'ID' with a dropdown menu and 'ID Value' with a text input field. At the bottom of the form, there are three buttons: 'Submit', 'Reset', and 'Close'. Below the form, there is a footer bar with the text 'Interface Developed for Liquid Telecom' and 'This site is best viewed with 1024 X 768 Resolution in IE 8 or above.'.

3. Dalo Raduis



← → ↻ ⚠ Not secure | bbpmneetel.co.za/daloradius-0.9-8/login.php

dalo RADIUS RADIUS Management, Reporting, Accounting and Billing by Enginx

daloRADIUS 0.9-8

Login Required Login Please

Username administrator


Password

Location Default

Login

© Copyright of Enginx and Liran Tal
Template design by Six Shooter Media

4. Crammer Webreport



← → ↻ 🛡 cramerwebreports.liquidtelecom.co.za:8168/LOVCGDATA/LdapLogin

LIQUID TELECOM

* Enter Username and Password

Username : *

Password : *

Login

*Use Liquid Telecom Domain (or) Cramer Application Username & Password for authentication.

5. Info Vista



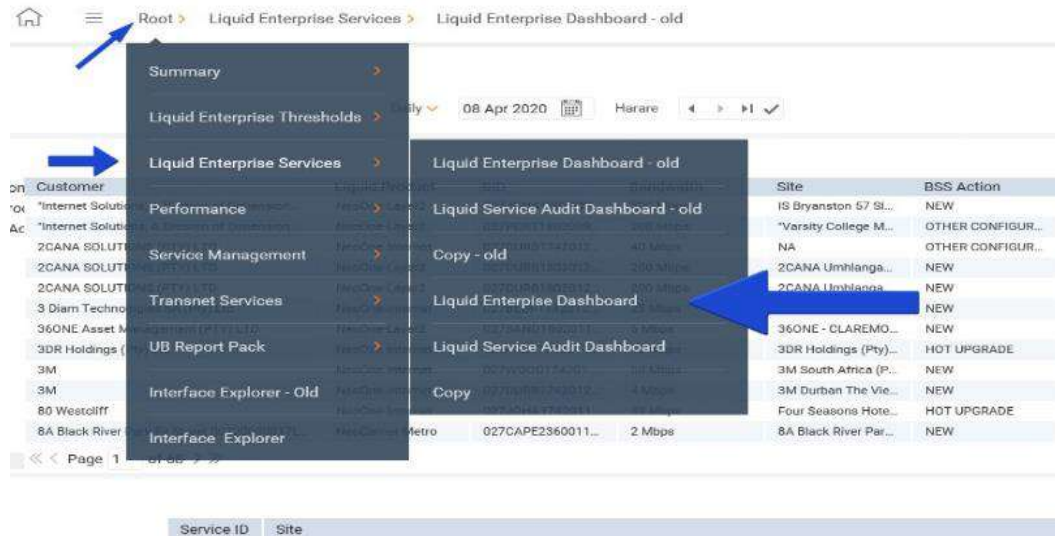
STEP BY STEP GUIDE TO FETCH UTILIZATION

- Network Product Monitored in info Vista
- URL
https://infovistainternal.liquidtelecom.co.za/VPortal/portal/page/Index.jsp?timeout=true&pagename=P_A6CC487ED14A4F8DBA07FC5EA0E46B7D#P_A6CC487ED14A4F8DBA07FC5EA0E46B7D
- **Login Page**



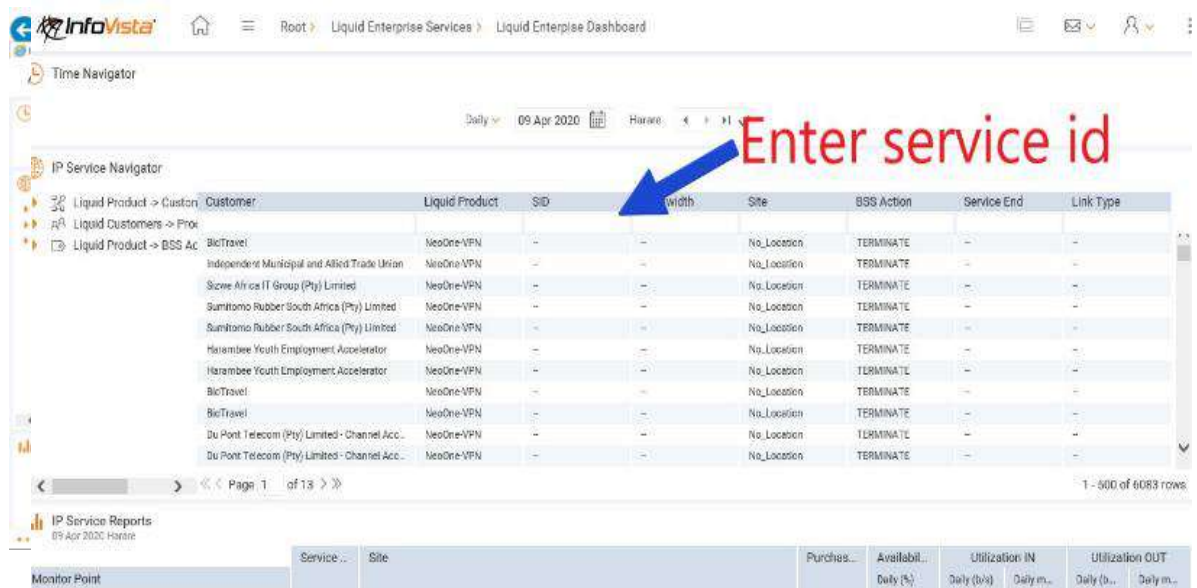
Enter user name -->> Password ->> click login

- **First Widget**



- **Dashboard**

Click on yes if you want to save password as shown in the image below



Digital Services

Cyber security



Cyber Security

Digital transformation is accelerating the adoption of cloud services and applications across all industries, amplifying the need for protecting users and business-critical data.

At Liquid Intelligent Technologies we offer comprehensive advisory and managed security services to assist organizations in assessing their business risks. We assist you in putting in place industry-leading protection services to ensure your employees remain productive, irrespective of their location of work. And, provide you with insights and control on what is most important to you - your data.

Giving you peace of mind with a 360° view of your entire business environment

Advisory and Managed Security Services:

- **Security and Identity Management**

We can assist in developing your Cloud Security Strategy to actively protect your business from threats and attacks. We deliver solutions that safeguards your business and users with continuous monitoring and administration of both your cloud and on-premises IT environment.

- **Advanced Threat Protection**

We incorporate threat intelligence feeds from global providers into a fully managed process that provides immediate alerts and remediation that assist in containing security threats across your IT systems.

- **Security Monitoring**

We provide 24x7 real-time monitoring and analysis of both cloud and on-premises IT environments to ensure your systems are protected and provide immediate remedies.

- **Data Loss Prevention (DLP) & Compliance Services**

We provide insights and control to your data stored in your cloud services, making your business more secure.

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

.

Data centres



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.



Connectivity solutions



➤ **Communicating with customers, suppliers and partners is essential to any business today.**

But with so much more of your business's critical data moving online or to the cloud, choosing the right technology partner is more important than ever before.

With Liquid Intelligent Technologies, you've found a partner that you can truly depend on to manage all your business's critical communications, data, tools and applications.

A partner with:

- **Local knowledge and expertise:** We are a proudly African, privately owned, independent company
- **A network like no other:** As a single network, we offer faster speeds, more reliability and tighter security than other networks
- **An extensive range of products and services:** We provide affordable and accessible solutions for businesses of all sizes

➤ **Communicating with customers, suppliers and partners is essential to any business today.**

But with so much more of your business's critical data moving online or to the cloud, choosing the right technology partner is more important than ever before.

With Liquid Intelligent Technologies, you've found a partner that you can truly depend on to manage all your business's critical communications, data, tools and applications.

A partner with:

- **Local knowledge and expertise:** We are a proudly African, privately owned, independent company
- **A network like no other:** As a single network, we offer faster speeds, more reliability and tighter security than other networks
- **An extensive range of products and services:** We provide affordable and accessible solutions for businesses of all sizes

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.

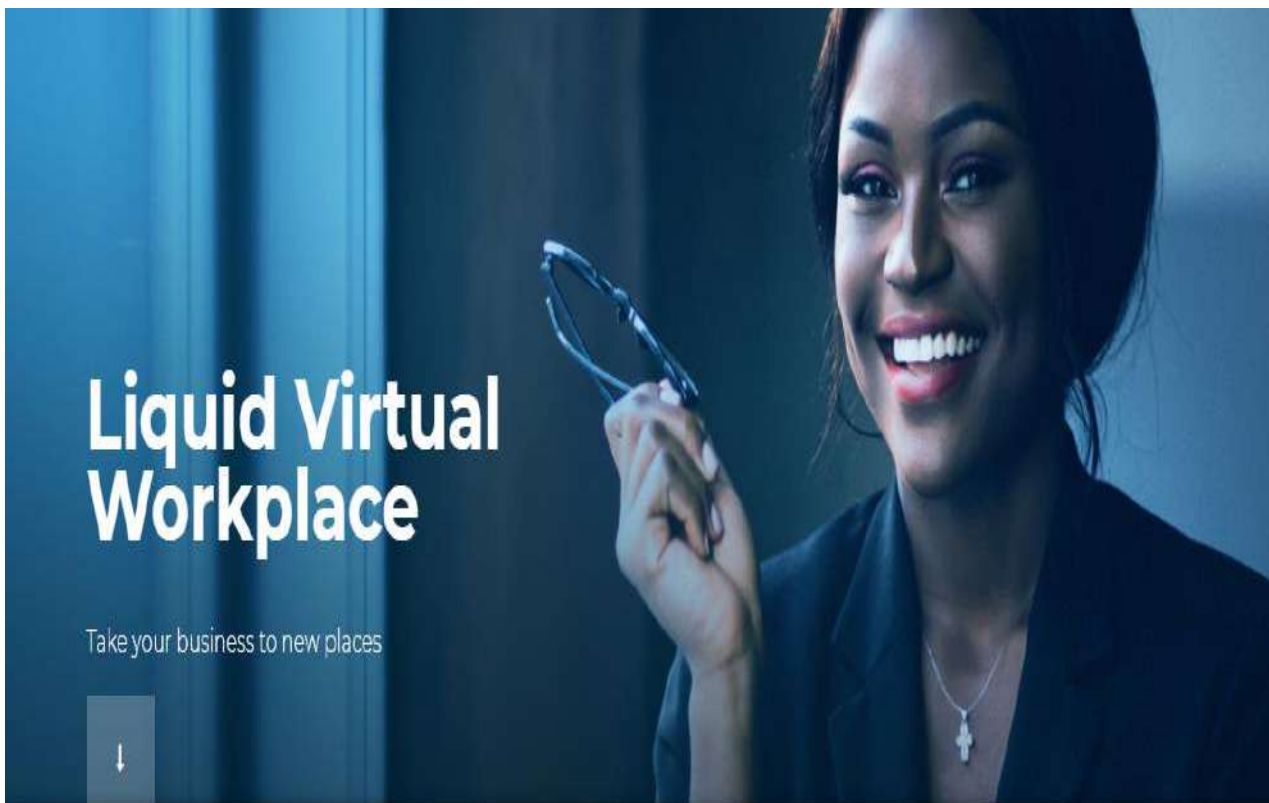
Africa's Cloud provides your business with:

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



Productivity solutions that keep you working from anywhere

Microsoft 365: Smarter collaboration and communication solutions – a must have for any modern workplace.

Let Microsoft's suite of productivity solutions drive your digital transformation. The benefits of working smarter have a direct impact on your ability to respond to increasing competitive pressures. No business can afford to be left behind. Microsoft 365 changes how work is done.

Business Class Email: We understand that sometimes you don't need an elaborate solution to keep your business running

If email is all the communications tool you need, then Microsoft Exchange Online is the perfect option for your business. It's an easy online service, that is both secure and reliable, and

provides you with a professional email service no matter the size of your business. With Exchange Online you are in complete control of your collaboration environment without the hassle of complicated email set-ups and management whilst still offering business class protection against unwanted spam.

Keep Communicating and Collaborating :

Tools that keep your teams and customers working together, virtually

Microsoft Teams: The hub for teamwork in Microsoft 365

Microsoft Teams empowers your teams to work how they want to work, providing complete control over the customization of their collaborative workspaces, and encouraging greater creativity and productivity.

Teams Business Voice: An enterprise calling experience within Microsoft 365.

Teams Business Voice is a full enterprise calling experience within your Microsoft 365 environment that brings together the power of Microsoft Teams with our carrier grade voice network to provide your business with a cloud-based telephony solution that drives collaboration, and communication.

Meet Me Conference Bridge: A free traditional audio-conference bridge solution

The Liquid Intelligent Technologies Meet-Me Conferencing Solution is perfect for customers who requires traditional audio-conferencing. Our standard solution is provided free and includes local number dialling.

Liquid Secure Remote Access: Directly connect remote workers to private applications running in public cloud environments or private data centres

Liquid Secure Remote Access directly connects remote workers to private applications running in public cloud environments or private data centers; reducing risk and simplifying security operations. Traditional remote access VPN solutions require capital expenditure of on-premise appliances.

Microsoft 365

Microsoft 365 Intelligent cloud services and advanced security

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 favourite Microsoft Office applications and innovative communication tools.

Microsoft 365 for business

New name, same great value, same price.

The image displays four Microsoft 365 Business plans, each with its name, a description of included services, and icons for the included applications.

- Microsoft 365 Business Basic**
Cloud Services
Includes icons for Exchange, Teams, SharePoint, and OneDrive.
- Microsoft 365 Business Standard**
Cloud Services and Desktop Apps
Includes icons for Exchange, Teams, SharePoint, OneDrive, Outlook, Word, Excel, PowerPoint, Publisher, and Access.
- Microsoft 365 Business Premium**
Cloud Services, Desktop Apps, and Advanced Security
Includes icons for Exchange, Teams, SharePoint, OneDrive, Outlook, Word, Excel, PowerPoint, Publisher, Access, Intune, and Azure Information Protection.
- Microsoft 365 Apps for business**
Desktop Apps
Includes icons for OneDrive, Outlook, Word, Excel, PowerPoint, Publisher, and Access.

Note: Not all features/product logos shown.

Key Benefits:

- **Powerful tools to support your enterprise.**
Connect employees to the people, information, and content they need to improve productivity and transform collaboration.
- **Modern Business Voice with Cloud PBX**
Teams Business Voice transforms your on-premise PBX into a fully integrated cloud-based communications solutions.
- **Hub for teamwork**
Digital workspace enables teams and cross-functional teams to work together in a virtual central location.

Flexible modern solution

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.

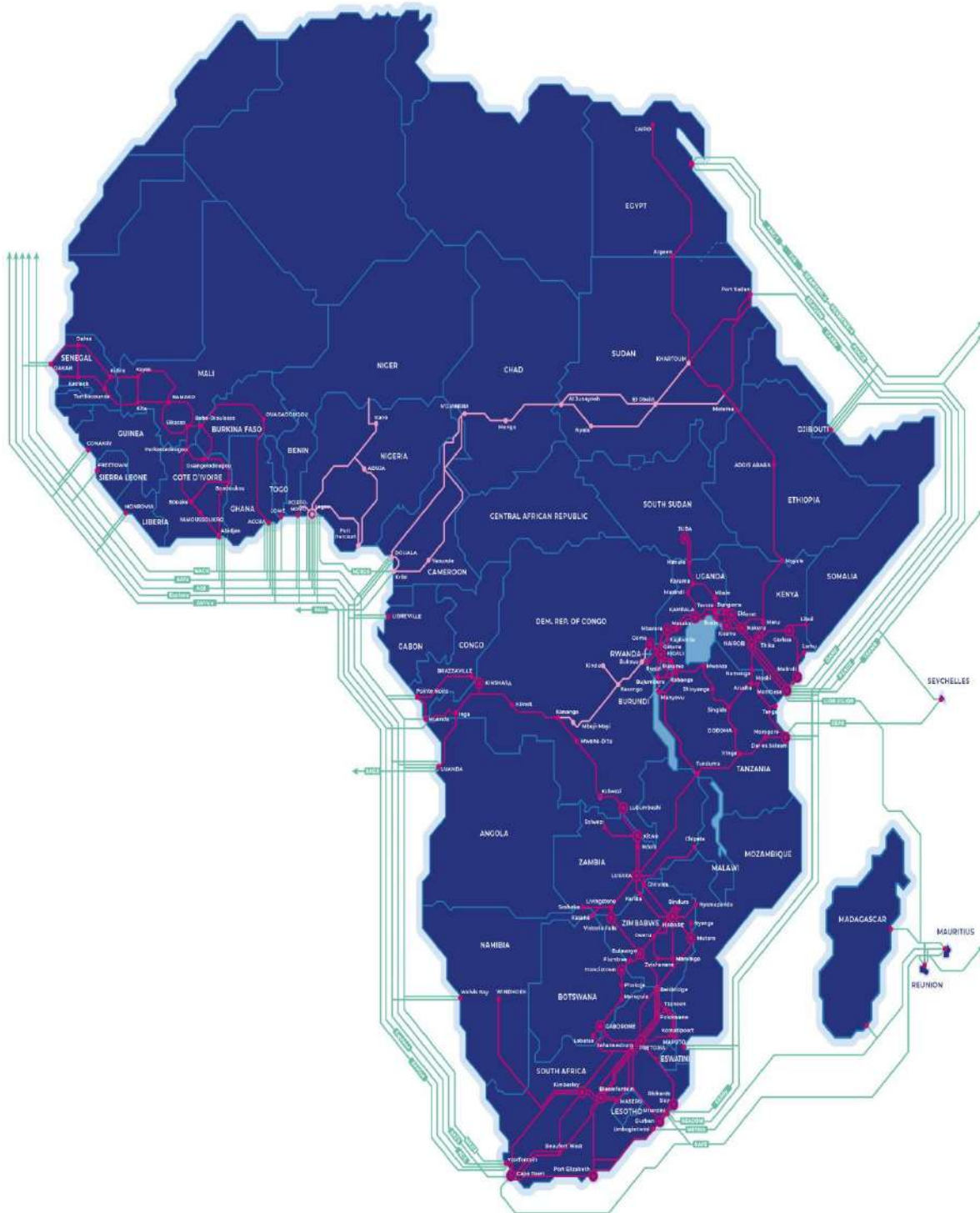
Microsoft Gold Competency Partner. We have worked hard to gain multi-discipline gold competency status with Microsoft, enabling us to provide the best advice and solutions to our customers.

Leading Cloud connectivity provider in Africa. Liquid Intelligent Technologies is a leading provider of cloud and fibre connectivity across Africa. Our carrier-grade network connects our customers and four carrier neutral data centres from Cape Town to Cairo in one continuous grid.

One touchpoint. One service provider, one invoice, completely managed. We offer wide range of products, including connectivity, hosting, voice, security and cloud services.

In-country billing means in your own currency. Our partnership with Microsoft enables us to bill you directly in the currency of your country, avoiding currency fluctuations linked to the US Dollar.

Our network



Our award-winning network at a glance:

- 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

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.

What is an internet gateway and how do they work?

An Internet gateway is a network "node" that connects two different networks that use different protocols (rules) for communicating. In the most basic terms, an Internet gateway is where data stops on its way to or from other networks. Thanks to gateways, we can communicate and send data back and forth with each other.

Gateways can take several different forms from hardware to software - including routers and computers - and can perform a variety of tasks. These can range from passing traffic to the next 'hop' on its path to filtering traffic, proxies, or protocol translations. Because gateways are, by definition, at the edge of a network, they are often combined with firewalls, which keep out unwanted traffic or 'foreign' computers from a closed network.

For Internet connections at home, the Internet gateway is usually the Internet Service Provider (ISP), who, in this case, offers access to the entire Internet through its own network. If you have a Wi-Fi connection at home, your Internet gateway is the modem or modem/router combination that your ISP provides so that you connect to the Internet through their network.

If your Internet gateway is a computer server, which is more likely in an office or business situation, it acts as a firewall and a proxy server. A firewall, as discussed earlier, keeps unwanted traffic and outside computers out of a private network. A proxy server makes sure that the actual server can handle your online data requests.

How routers work as gateways

Routers are often Internet gateways. They are a piece of hardware that essentially connects your computer to the Internet. In home networks, it is usually something that comes with software you can install on one computer and then connect other computers to as well. Then everyone connected to your router can connect to the Internet through your ISP. While a router can be connected to more than two networks at a time, this is usually not the case for routers used at home.

When you send a computer through your computer, your router will figure out the next destination of the data depending on the networks it's connected to. This is how a router acts as a gateway because it controls the path through which the information is sent and retrieved.

In short, an Internet gateway is one of the ways that information is sent and delivered to us as we use the Internet. It is what gives us the ability to access other networks to view web pages, initiate downloads or uploads, buy things online, and more.

What is an Internet Exchange Point?

An Internet exchange Point (IXP) is a physical location through which Internet infrastructure companies such as Internet Service Providers (ISPs), CDNs, web enterprises, communication service providers, cloud and SaaS providers connect to exchange Internet traffic. Network access points (NAPs) are the predecessors of IXPs. These Internet exchange locations collocate different networks and allow network providers to share transit interconnections outside their network. By having a presence inside of an IXP location, companies can shorten their path to the transit coming from other participating networks, thereby reducing latency, improving round-trip time, and potentially reducing costs.

The earliest of IXPs can be traced back to the creation of Network Access Points (NAPs) when the National Science Foundation Network (NSFNET) was decommissioned. That began in 1994, a carefully orchestrated plan for transitioning the NSFNET backbone service to private industry.

At its core, an IXP is essentially a data center containing network switches that route traffic between the different network operators who share the costs of maintaining the physical infrastructure. According to the Peering DB database, there are more than 600 IXPs around the world (as of April 2018). IXPs are essentially large Layer 2 LANs built with one or many Ethernet switches interconnected together across one or more physical buildings.

IXPs came into existence to remedy the deficiency of peering connections among Autonomous Systems (ASes). IXPs help reduce the portion of an ISP's traffic that must be delivered via their upstream transit providers, thereby reducing the average per-bit delivery cost of their service. IXPs play an essential role in reducing the cost of transit connections over the Internet.

Who Connects to an IXP?

Any network that wants to peer with other networks can connect to Internet Exchange Points. Typically, Internet service providers (ISPs) are at the head of local IXP users, selling Internet access to their customers. This allowed an ISP's customers to readily connect to each other at exchange points. More recently, exchange point customers are often content providers, who peer with ISPs to get their content to the ISPs' customers. Content providers also connect to exchange points to exchange traffic with each other.

The following list of companies includes a representative list of companies and organizations that use IXPs across a broad spectrum of needs:

- CenturyLink
- Windstream
- Verizon Digital Media Services
- Bharti Airtel UK Limited
- Twitter
- LinkedIn
- Salesforce.com
- Google
- Microsoft
- Amazon
- Digital Reality
- Williams College

Just this short list shows how much IXPs are relied upon to exchange traffic with the Internet. IXPs have become a huge part of the Internet ecosystem that is integral to the digital experience of users in businesses and organizations alike.

WHAT IS CORPORATE INTERNET CONNECTIVITY?

Businesses require more reliable and secure internet services than a retail broadband, for running their operations effectively. Corporate Broadband is a unique value proposition of ACT Enterprise, curated exclusively for small enterprises and young start-ups with 10-20 employees. It offers enterprise-grade connectivity at reasonable prices, when compared to an internet leased line.

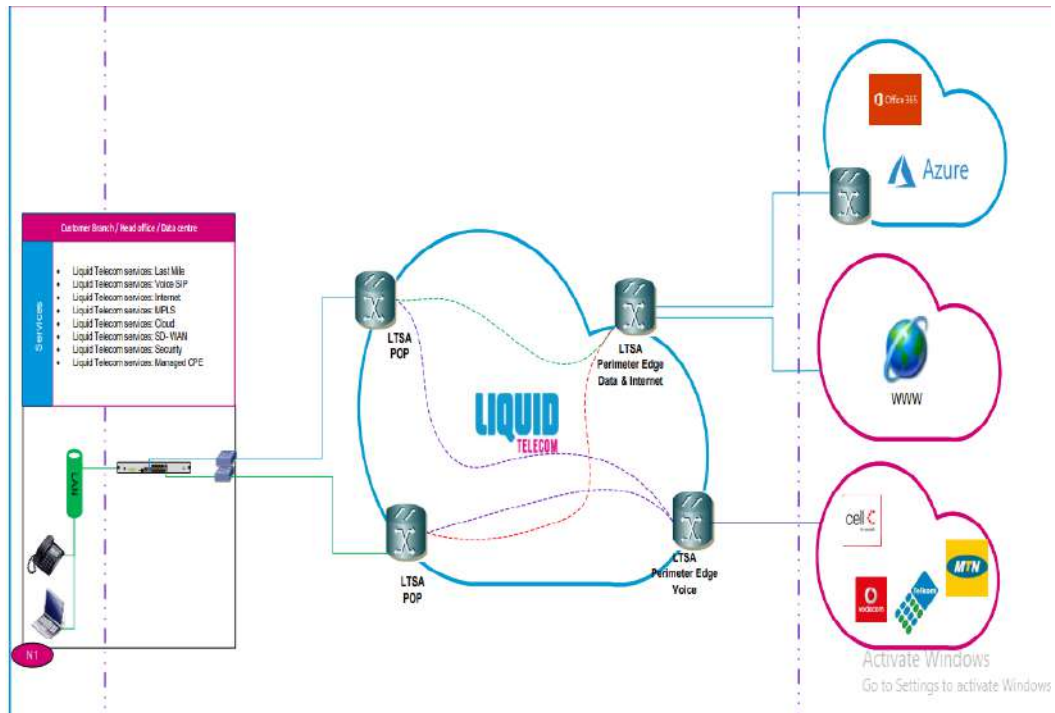
Features:

1. High speed broadband
2. Bundled static IP
3. Huge FUP
4. Widespread reach

The ACT Enterprise Advantage

1. Faster link delivery and activation
2. Service at your door step by in-house operation experts
3. 24x7 Customer Care
4. Self-healing resilient IP backbone
5. One-step plan upgradation facilities

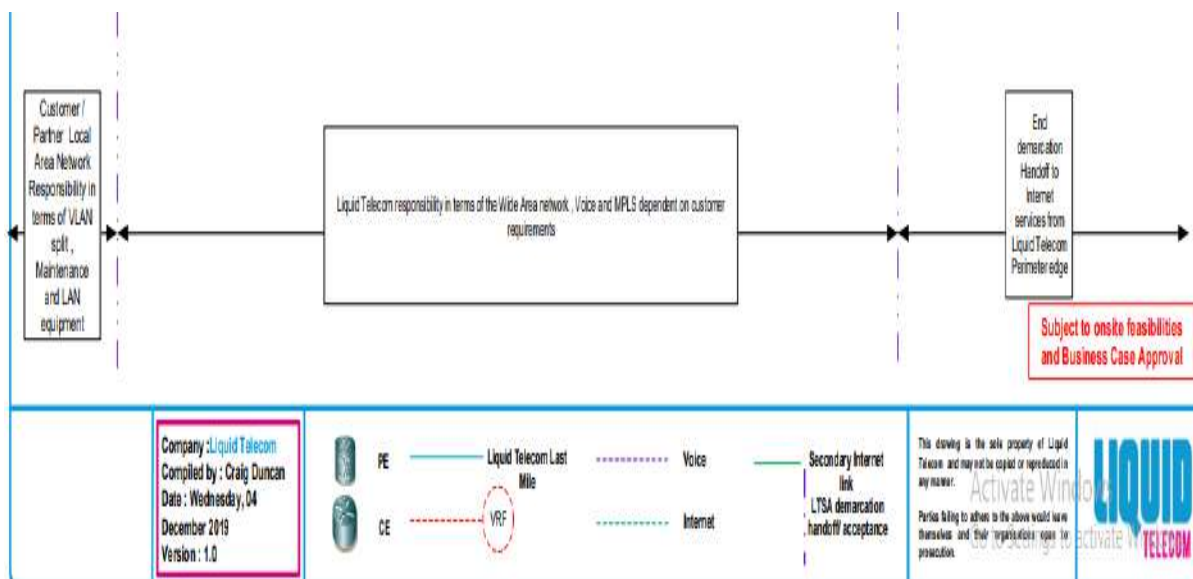
CORE LIQUID NETWORK OVERVIEW DIAGRAM



How to identify what type of device is it?

we can see the device type on web report or we can login the device on secureCRT and run the command **show version**.

Snap attached for the reference



L3 service :::

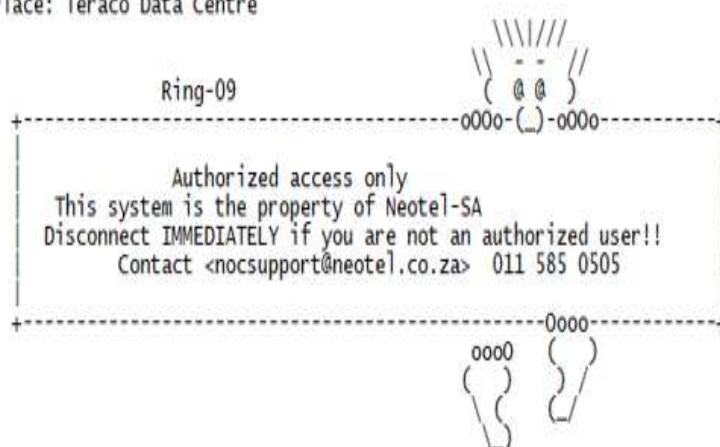
End to End service verification of link down for Internet Services

Steps to check the service:

1. Find BNG IP from tereco data centre by CMD " show route or internet CPE IP.

✓ 172.16.66.120 ✗

Place: Teraco Data Centre



Last switch-over Fri Jul 19 17:01:15 2019: 26 weeks, 5 days, 20 hours, 28 minutes ago

RP/0/RSP1/CPU0:gtdc01c9006x01a#

RP/0/RSP1/CPU0:gtdc01c9006x01a#

RP/0/RSP1/CPU0:gtdc01c9006x01a#

RP/0/RSP1/CPU0:gtdc01c9006x01a#show vrf internet 41.164.199.100

% Invalid input detected at '^' marker.

RP/0/RSP1/CPU0:gtdc01c9006x01a#show route vrf internet 41.164.199.100

Thu Jan 23 13:30:04.533 UTC

Routing entry for 41.164.199.96/28

Known via "bgp 36937", distance 200, metric 0, type internal

Installed Jan 22 12:16:18.009 for 1d01h

Routing Descriptor Blocks

172.16.88.1, from 172.16.65.8

Nexthop in Vrf: "default", Table: "default", IPv4 Unicast, Table Id: 0xe0000000

Route metric is 0

No advertising protos.

Activ
Go to

2) Take BNG IP then find port and vlan details after login it.

```
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#sh running-config formal | i 3178
Fri Jan 24 14:21:48.304 SAST
Building configuration...
interface Bundle-Ether1.3178 l2transport
interface Bundle-Ether1.3178 l2transport encapsulation dot1q 3178
interface Bundle-Ether1.3178 l2transport rewrite ingress tag pop 1 symmetric
interface GigabitEthernet105/0/0/37.3178 l2transport
interface GigabitEthernet105/0/0/37.3178 l2transport description 027PRET1742013599369/CUST/South African Pharmacy Council/N
interface GigabitEthernet105/0/0/37.3178 l2transport encapsulation dot1q 3178
interface GigabitEthernet105/0/0/37.3178 l2transport rewrite ingress tag pop 1 symmetric
interface BVI3178
interface BVI3178 vrf internet
interface BVI3178 ipv4 address 41.161.74.161 255.255.255.240
l2vpn bridge group vlan_3178
l2vpn bridge group vlan_3178 bridge-domain vlan_3178
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 mtu 4470
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 interface Bundle-Ether1.3178
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 interface GigabitEthernet105/0/0/37.3178
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 interface GigabitEthernet105/0/0/37.3178 storm-control multicast kbps
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 interface GigabitEthernet105/0/0/37.3178 storm-control broadcast kbps
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 interface GigabitEthernet105/0/0/37.3178 split-horizon group
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 vfi 027PRET278010201528
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 vfi 027PRET278010201528 neighbor 41.171.4.239 pw-id 1000001811
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 vfi 027PRET278010201528 neighbor 172.16.104.16 pw-id 1000001811
l2vpn bridge group vlan_3178 bridge-domain vlan_3178 routed interface BVI3178
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#show arp vrf internet BVI3178
Fri Jan 24 14:22:49.025 SAST
```

3) find mac/IP address of cpe device. And ping cpe ip. If Its pinging means link is working fine.

```
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#show arp vrf internet BVI3178
Fri Jan 24 14:22:49.025 SAST
```

Address	Age	Hardware Addr	State	Type	Interface
41.161.74.161	-	78ba.f945.acde	Interface	ARPA	BVI3178
41.161.74.162	00:00:02	0000.0000.0000	Incomplete	ARPA	BVI3178
41.161.74.165	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.166	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.168	00:00:03	0000.0000.0000	Incomplete	ARPA	BVI3178
41.161.74.169	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.170	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.171	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.172	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.173	-	0000.0000.0000	Deleted	ARPA	BVI3178
41.161.74.174	00:23:20	4c5e.0c06.ccd4	Dynamic	ARPA	BVI3178

```

0/0/CPU0
Address      Age      Hardware Addr  State  Type  Interface
41.161.74.161 -        78ba.f945.acde Interface ARPA   BVI3178
41.161.74.162 00:00:02 0000.0000.0000 Incomplete ARPA   BVI3178
41.161.74.164 -        0000.0000.0000 Deleted  ARPA   BVI3178
41.161.74.165 -        0000.0000.0000 Deleted  ARPA   BVI3178
41.161.74.171 00:00:03 0000.0000.0000 Incomplete ARPA   BVI3178
41.161.74.173 -        0000.0000.0000 Deleted  ARPA   BVI3178
41.161.74.174 00:23:21 4c5e.0c06.ccd4 Dynamic  ARPA   BVI3178
RP/0/RSP0/CPU0:qpry01c9006x01a#
RP/0/RSP0/CPU0:qpry01c9006x01a#ping vrf internet 41.161.74.174
Fri Jan 24 14:23:29.254 SAST
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 41.161.74.174, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
RP/0/RSP0/CPU0:qpry01c9006x01a#

```

Ac

Gg

Focus

📖

End to End service verification of link down for Neo VPN Service

- 1) First of all we will log the the APE and will run the below command to check port status.

```
RP/0/RSP0/CPU0:gbooysc9001d01a#show 12vpn forwarding bridge-domain vlan_3302:vlan_
Mon Mar 16 11:51:43.348 UTC
To Resynchronize MAC table from the Network Processors, use the command...
12vpn resynchronize forwarding mac-address-table location <r/s/i>

Mac Address      Type      Learned from/Filtered on    LC learned Resync Age
-----
00c0.8937.f48c dynamic Gi102/0/0/25.3302      0/0/CPU0    0d 0h 0m 12s
70fc.8c1b.1ff0 dynamic Gi102/0/0/25.3302      0/0/CPU0    0d 0h 0m 5s
e8ed.f33c.69fd routed BD id: 17                      N/A         N/A
```

- 2)After checking port status. we will check the VRF status

```
RP/0/RSP0/CPU0:gbooysc9001d01a#show vrf v001-khafllins
Mon Mar 16 11:53:21.051 UTC
VRF          RD          RT          AFI  SAFI
v001-khafllins 36937:625240932 import 36937:62524 IPV4 Unicast
export 36937:62524 IPV4 Unicast
```

- 3)By the below command we will get the dynamic ip

```
RP/0/RSP0/CPU0:gbooysc9001d01a#show arp vrf v001-khafllins | in 3302
Mon Mar 16 11:53:28.209 UTC
172.20.32.17 - e8ed.f33c.69fd Interface ARPA BVI3302
172.20.32.18 01:14:44 70fc.8c1b.1ff0 Dynamic ARPA BVI3302
```

ZHONE DEVICE: Basic troubleshooting guide

First of all login the zhone device in web browser by getting username password from BBPM

Device info

Device Info includes information about the device, MIB-2 objects, system up time, model number, serial number, version information and the MAC addresses of the interfaces

DZS EVERY CONNECTION MATTERS **wtrsrzhe26a01d**

System
Configuration
Tests
Status

Device Info
Statistics
Interfaces
Route
ARP
Firewall
Bridge Table
DHCP
IGMP
LLDP-MED
Wireless
Voice

Status - Device Info

Summary of System Information

	Description	Status
System	Name	wtrsrzhe26a01d
	Location	Neotel
	Contact	Neotel IP NOC - EU Multiple MLV
	Date and Time	Thu Jan 1 02:31:38 1970
	Uptime	2 hours, 31 minutes, 39 seconds
	Model Number	ZNID-GE-2426A-UK
	Serial Number	307228907
	Registration ID	0000000000
Firmware	Bootloader Version	1.0.38-114.185 (3.1.330)
	Version	S3.1.330
	Alternate Version	S3.0.738
Ethernet LAN Interfaces	Fiber WAN (eth0)	00:02:71:6e:4d:eb
	GE1 - GigE (eth1)	3a:02:71:6e:4d:ec
	GE2 - GigE (eth2)	3a:02:71:6e:4d:ed
	GE3 - GigE (eth3)	3a:02:71:6e:4d:ee
	GE4 - GigE (eth4)	3a:02:71:6e:4d:ef
Wireless	SSID 0 (wl0)	72:02:71:6e:4d:ec
	SSID 1 (wl0_1)	72:02:71:6e:4d:ed
	SSID 2 (wl0_2)	72:02:71:6e:4d:ee
	SSID 3 (wl0_3)	72:02:71:6e:4d:ef
Alarms	Minor System Alarm 1:	UserLockedOutFromTelnet
	Minor System Alarm 2:	UserLockedOutFromSsh

PPPoE status:

This table provides interface status for each PPPoE uplink tunnel. This status includes the time that the connection has been up the configured MTU size, and the last error code reported for this interface.

← → ↻ ⚠ Not secure 10.100.133.46

Apps Gmail ServiceNow OpenNMS Web Co... cramenweb Microsoft Azure Co... Enterprise Custome... SuccessFactors: Pi

DZS EVERY CONNECTION MATTERS wtrsrzhe26a01d

System Configuration Tests Status

Device Info Statistics Interfaces LAN IPv6 PPPoE Route ARP Firewall Bridge Table DHCP IGMP LLDP-MED Wireless Voice

Status - Interface PPPoE

PPPoE Status

Interface	Interface Type	Status	Uptime	Current MTU	Last Error Code	
eth4.v133.ppp	Bridged	Connected	1 hours, 21 minutes, 45 seconds	1492 bytes	ERROR_NONE	<div>Connect Disconnect</div>

We can check Vlan configuration on configuration tab by clicking VLAN

Apps Gmail ServiceNow OpenNMS Web Co... cramenweb Microsoft Azure Co... Enterprise Custome... SuccessFactors: Perf...

DZS EVERY CONNECTION MATTERS wtrsrzhe26a01d

Tests Status System Configuration

System Info Static Route Access Control Firewall Interfaces L2CP LLDP-MED RIP Parental Control Wireless Voice VLAN Settings Filter Rules WAN Backup

VLAN Network Setup

		Fiber WAN	GE1 - G1gE	GE2 - G1gE	GE3 - G1gE	GE4 - G1gE	SSID 0	SSID 1	SSID 2
		eth0	eth1	eth2	eth3	eth4	wl0	wl0_1	wl0_2
Port:	Uplink	-	-	-	-	Uplink	-	-	-
Defaults:	Default PVID	200	200	133	3265	200	133	133	133
	Default 802.1p	0	0	0	0	0	0	0	0
	IGMP PVID	0	0	0	0	0	0	0	0
	IGMP 802.1p	0	0	0	0	0	0	0	0

Edit Port Defaults

	select column	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VLAN	VLAN ID	133	200	500	3265
	VLAN Name	PPPoE	Data_Vlan	Mgmt	MLV
	Connection Type	PPPoE_Bridged	BRouted	Bridged	Bridged
	Secure Forwarding	Disable	Disable	Disable	Disable
Port	Fiber WAN (eth0)	-	T	-	-
	GE1 - G1gE (eth1)	-	U	-	-
	GE2 - G1gE (eth2)	U	-	-	-
	GE3 - G1gE (eth3)	-	-	-	U
Membership	GE4 - G1gE (eth4)	T	-	T	T

ASD P1

ASD P1 is a team that works on mainly link down cases. These are cases as to how the customer is connected to their ISP.

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 requirements of an ISP?

An ISP must have the below:

- 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.

Internet from the 1990's till date

Dial up	Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network to establish a connection to an Internet service provider by dialing a telephone number on a conventional telephone line
DSL (Digital Subscriber Line) / ADSL	Digital subscriber line is a family of technologies that are used to transmit digital data over telephone lines. In telecommunications marketing, the term DSL is widely understood to mean asymmetric digital subscriber line, the most commonly installed DSL technology, for Internet access. ADSL works by using spectrum above the band used by voice telephone calls. With a DLS filter, often called a splitter, the frequency bands are isolated, permitting a single telephone line to be used for both ADSL service and telephone calls at the same time. ADSL is generally only installed for short distances from the telephone exchange
Fibre	Fiber optic cables use small glass fibers to transmit data using pulses of light. The light travels much like electricity would through a copper wire, but the advantage is that fiber cables can carry multiple signals at once. They're incredibly small, so they're often bundled into larger cables called "fiber optic trunk cables," each containing multiple fiber lines. Fiber cables carry huge amounts of data, and the average speed that you'll see at your house is around 1 Gbps (often called "gigabit internet").

Corporate vs Home Internet

Corporate Internet	Home Internet
This is used by people that are heavily dependent on the internet to make/have a business function. This means running a business over the internet and must have a stable connection.	This is mostly used by individuals that are using the internet for entertainment purposes. Not as important as someone that requires a corporate internet

Architecture of Liquid Telecom (LTSA)

- There are 3 layers that are used.
 1. Core layer (provider router. High end routers)
 2. Distribution Layer (MPE high end routers /L3 devices)
 3. Access Layer (Low end APE and switches)

Core Layer	The core network provides high-speed, highly redundant forwarding services to move packets between distribution-layer devices in different regions of the network. Core switches and routers are usually the most powerful, in terms of raw forwarding power, Never terminate a service from the core.
Distribution Layer	The distribution layer is the <i>smart</i> layer in the three-layer model. Routing, filtering, and QoS policies are managed at the distribution layer. Distribution layer devices also often manage individual branch-office WAN connections.
Access Layer	End-stations and servers connect to the enterprise at the <i>access layer</i> . Access layer devices are usually commodity switching platforms and may or may not provide layer 3 switching services. The traditional focus at the access layer is minimizing "cost-per-port": the amount of investment the enterprise must make for each provisioned Ethernet port. This layer is also called the desktop layer because it focuses on connecting client nodes, such as workstations to the network.

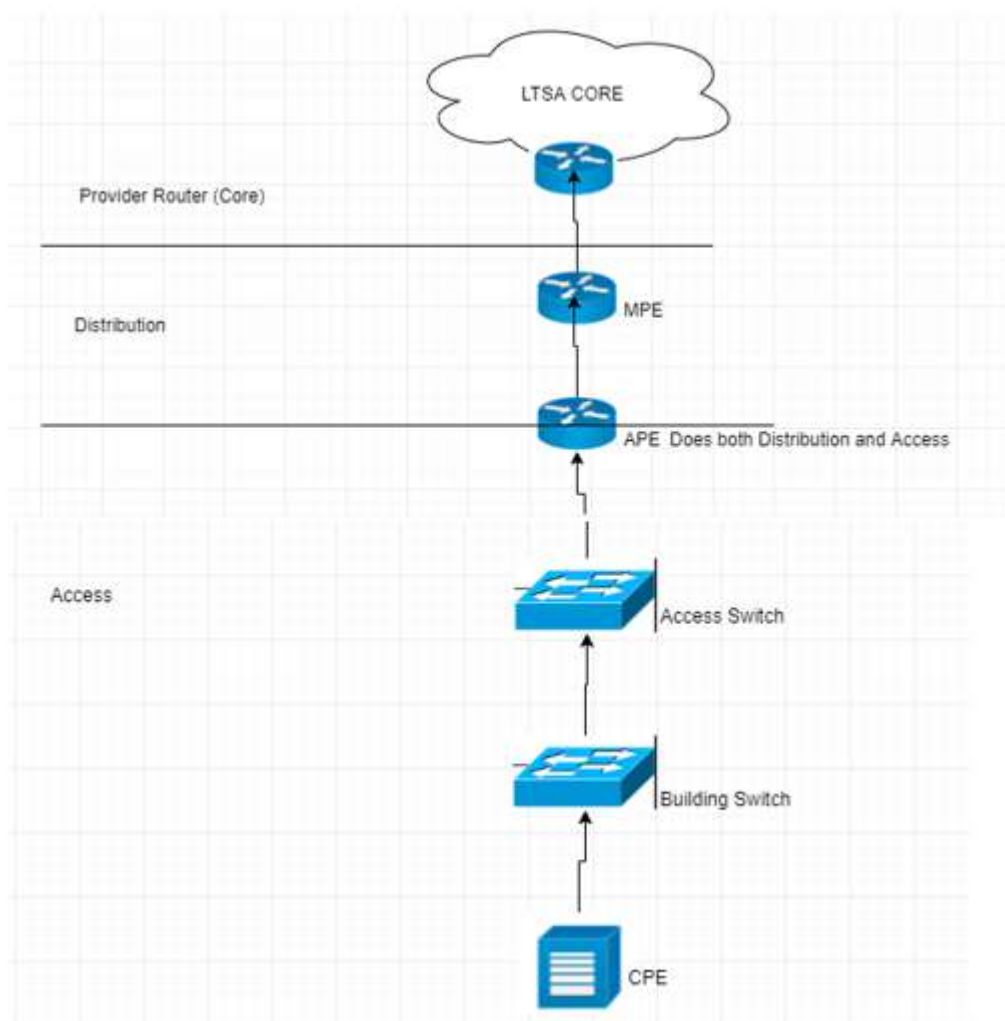
CPE (Customer Provider Edge)

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.

- However, there are two types of CPE

Customer owned CPE	Managed CPE
This is fully responsible by the customer and the ISP has no configurations done to the CPE.	This is when the ISP has to entirely configure the customer router and the customer doesn't have to do anything.

Basic LTSA Network design



Services from LTSA

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

Dark fibre : This is a dedicated line to only one customer.

Last mile	This gives connectivity to the user. (fibre , ethernet, microwave) , this is how the customer is connected on Layer 1
-----------	---

How to check/tshoot the last mile

- Login the Access Switch
- Check for MAC Address
- Ping CPE from the MPE

ASD P1 – Troubleshooting

Step 1 : Look at the name of the customer

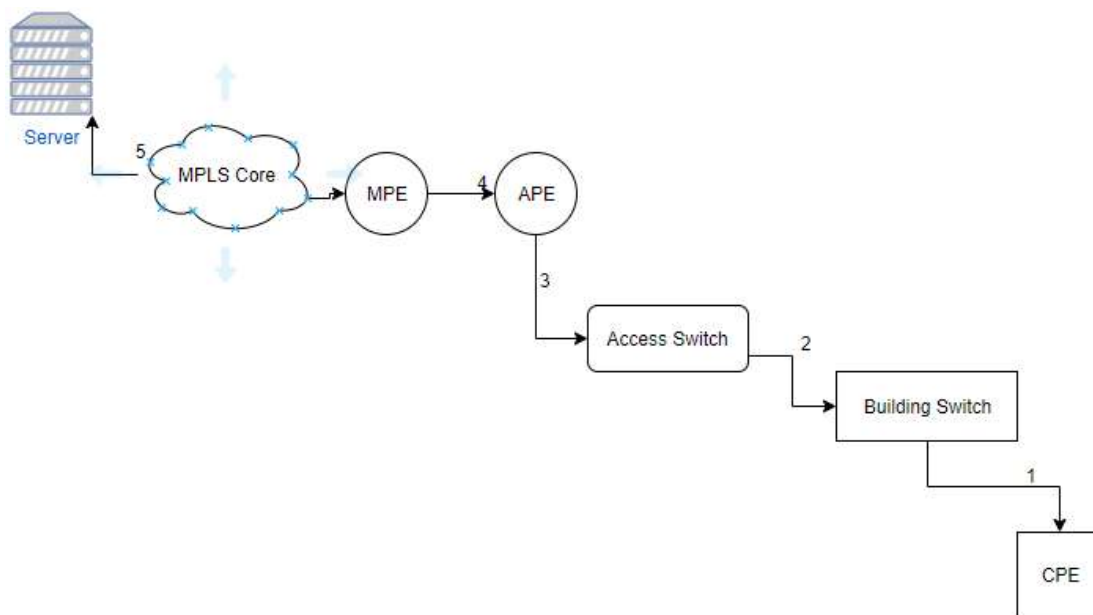
Step 2 : Check the service ID in web report

Step 3 : check last mile for the customer

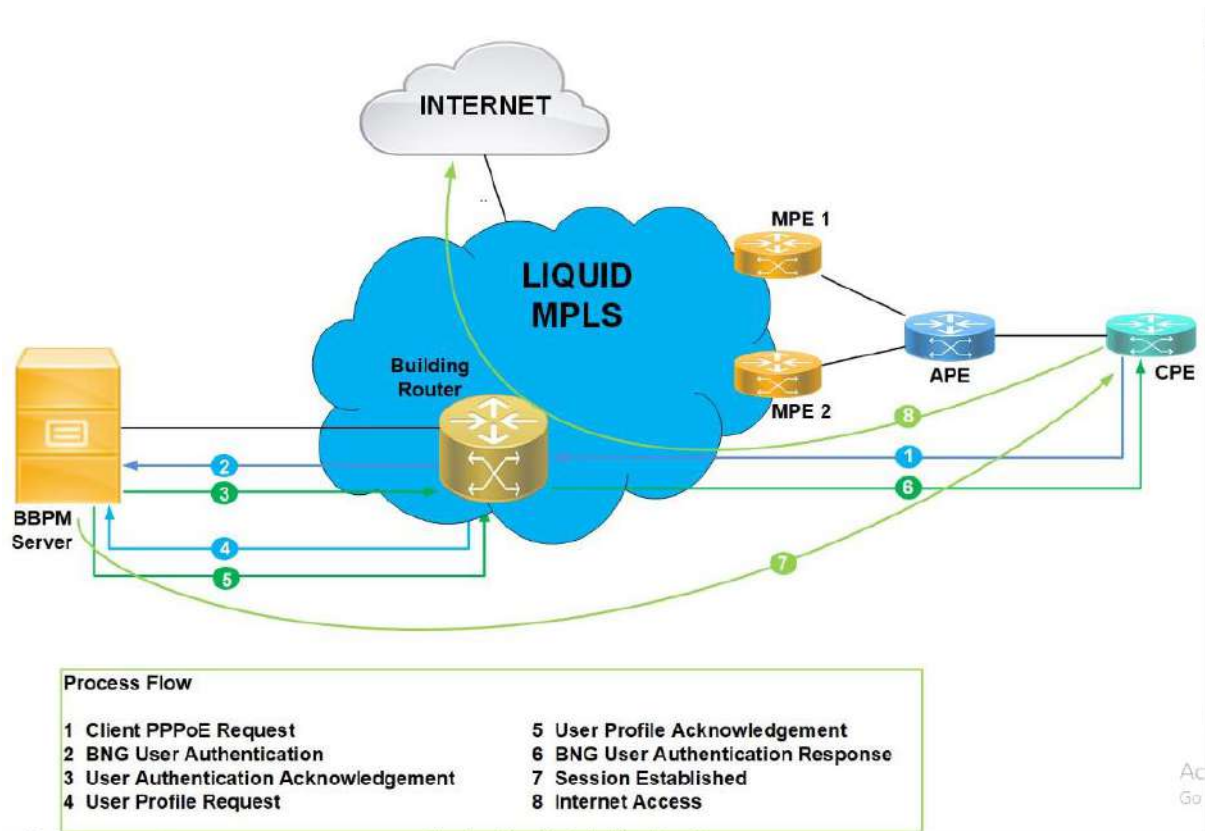
1. Login to PE Router. (this was known after reading the tshooting guide that was shared)
2. Show running configuration of the interface.
3. Select SPOKE/HUB VRF.

4. Ping SPOKE/HUB IP using VRF interface.
5. Ping Head office router taking spoke as source.
6. If not reachable then verify the transit path.

Below is a diagram explaining how the Tshoot will happen : (done by my imagination as to how it should look like)

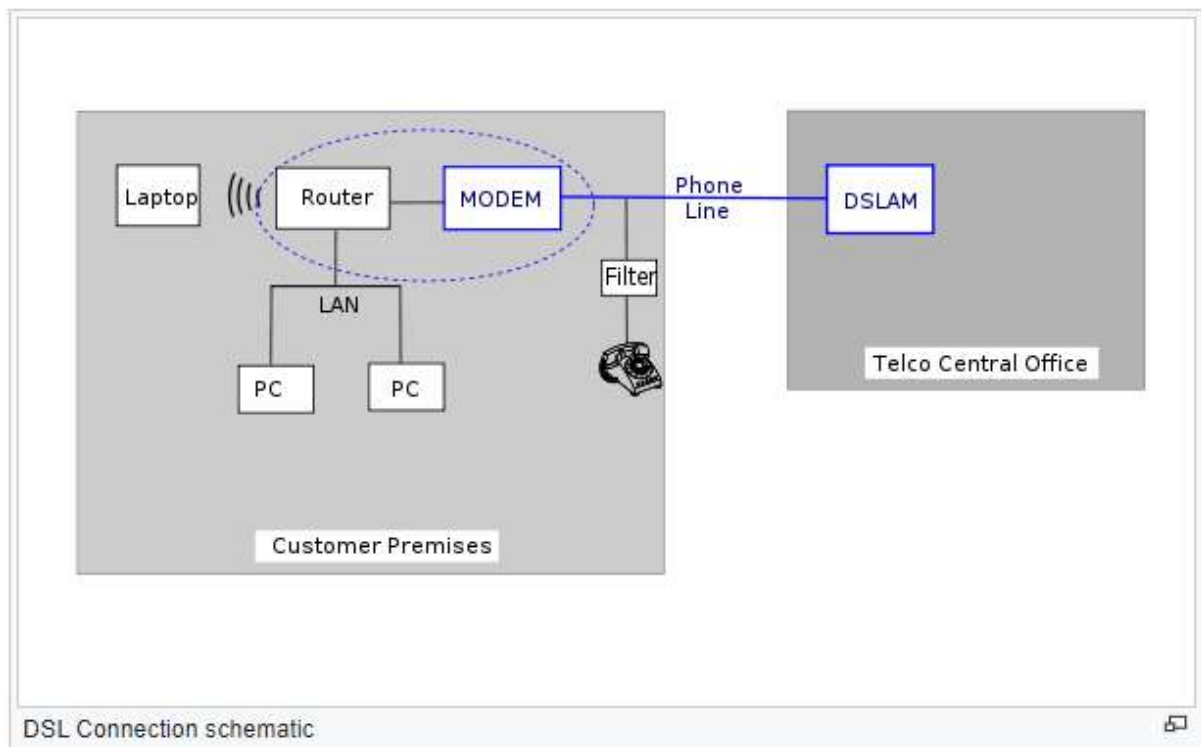


- You can then ping the BS (Building Switch) and if the BS is reachable and customer has no connectivity , there might be a config issue on the BS
- If the BS is down , you then , check if the AS (Access Switch) is reachable and the APE (Access Provide Edge) is reachable.
- If APE and MPE is not reachable, this will result in a major outage.
- Also will need to check how many point of failures there are present.



Ac
Go

DSL stands for Digital Subscriber Line. Users get a high speed bandwidth connection from a phone wall jack on an existing telephone network. **DSL** works within the frequencies that the telephone doesn't so you can use the Internet while making phone calls.



How does DSL work?

Consider DSL Internet the big brother to dial-up. Many local phone services provide DSL offering High Speed Internet access over existing telephone networks. Telephone wires carry hundreds of thousands of frequencies. Only a few thousand are used for voice communications so the telephone and DSL modem can work at the same time.

There are two main types of DSL technology.

Symmetrical DSL— Symmetrical connections offer equal bandwidth for upload and download speeds.

Asymmetrical DSL— This is the most popular type of DSL connection. Most people download more information than they upload. Of this, an asymmetrical connection has more downstream bandwidth and less upstream bandwidth.

Is DSL right for me?

Pros

- * Because it is built on existing phone lines, DSL is widely available.
- * It costs less than satellite or broadband Internet connections.

With DSL, each Internet subscriber has a dedicated circuit, just as they would with phone service.

- * peak Internet usage times.

Cons

- * There are faster types of Internet connections, but these usually cost more.
- * DSL connection is distance-sensitive, meaning the connection is better the closer you are to the central office.

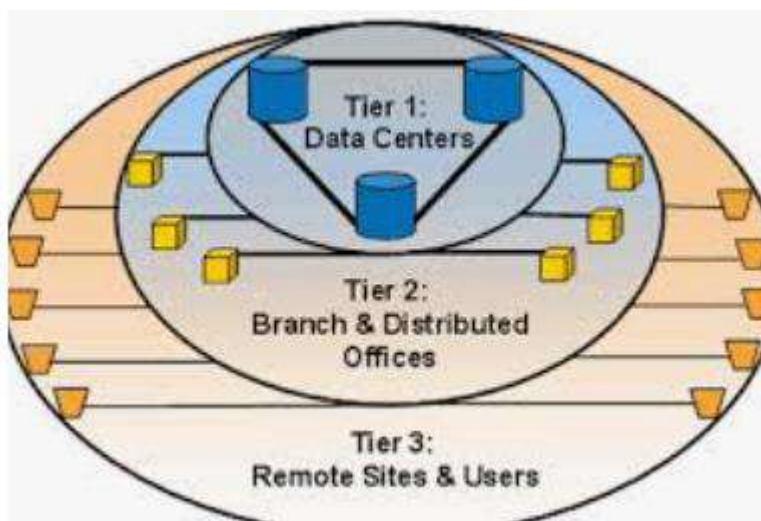
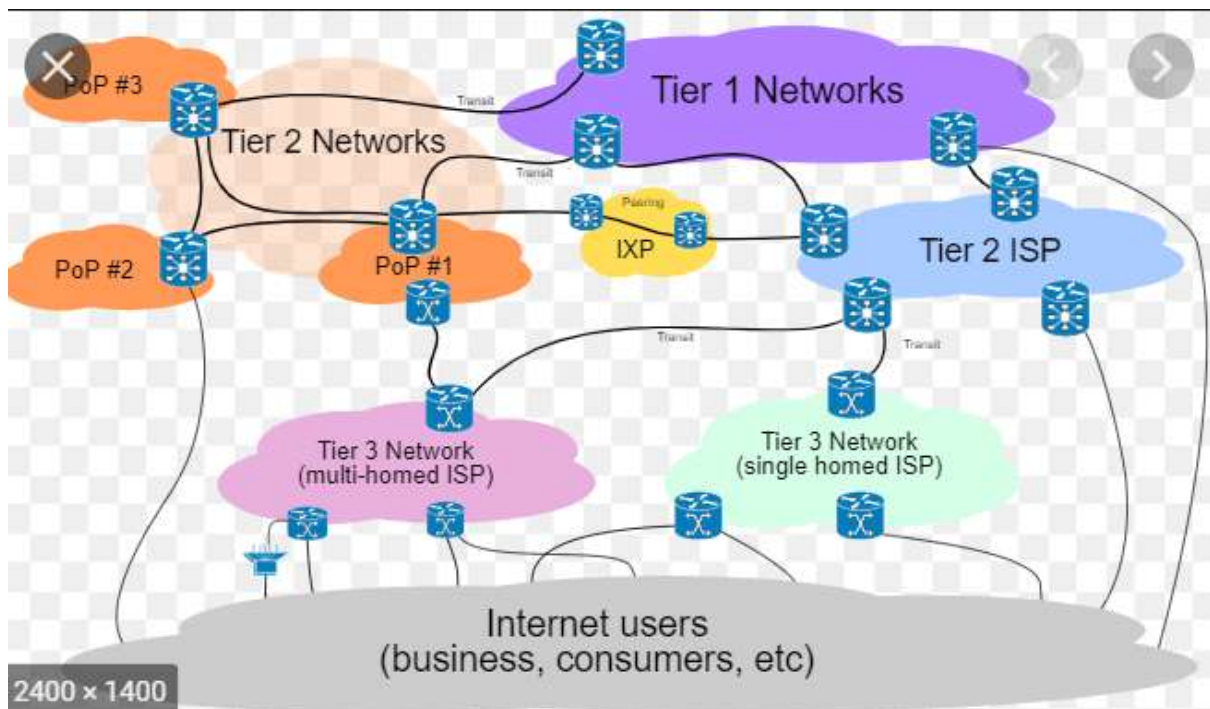
Tier 1, Tier 2 and Tier 3 ISP

Tier 1 networks can exchange traffic with other **Tier 1 networks** without having to pay any fees for the exchange of traffic in either direction, while some **Tier 2 networks** and all **Tier 3 networks** must pay to transmit traffic on other **networks**.

Tier 1 networks without having to pay any fees for the

exchange of traffic in either direction, while some **Tier**

2 networks and all **Tier 3 networks** must pay to transmit traffic on other **networks**.



Tier 1 Service Provider

Tier-1 carriers are the “movers and shakers” of the Industry. Tier 1 Service Providers own networks, which does not purchase transit service from any other network, and therefore peers with every other Tier 1 network to maintain global reach. They are the biggest providers geographically, but not always the number of customers point of view.

Benefit from Tier 1 Service Providers

Tier-1 providers can be an advantage when it comes to handling DDoS attacks. They can implement the null-route at their borders, so there is no point of saturation.

Tier 2 Service Provider

A network with transit connections, customers and some peering, but not global reach. They rely on Tier-1s to reach some portion of the Internet.

Benefit from Tier 2 Service Providers

Tier-2's are usually smaller companies, and are better able to “make deals” with customers. They can offer Service Level Agreements (SLAs), trench fiber to your location in exchange for a fixed fee. If you want to bundle contracts with Tier-1s, you will probably get a better deal from a Tier-2.

Tier 3 Service Provider

A stub network, typically without any transit customers, and without any global reach. They rely on Tier 2 Service Providers for their transit Internet connection, sometimes even for their power supply.

Benefit from Tier 3 Service Providers

When you hear people talk about net neutrality, this is why. Tier-3 c

internet without a network of their own.

OA Configuration

Port forwarding

- 1 enter option : 'ip' then 'router'
- 2 enter option : nat[NAT_PPPOE]
- 3 enter option : serviceAvailable table
- 4 create a table
- 5 configure : pat address(destination IP) | protocol(tcp/udp) | startPort(port number) | endPort(port number)

The screenshot shows the TMA configuration interface. On the left, the 'Containment tree' displays a hierarchy of folders. 'ip' is expanded, showing 'router' (step 1). 'router' is expanded, showing 'nat[NAT_PPPOE]' (step 2). On the right, the configuration page for '/router1623/ip/router/nat[NAT_PPPOE]' is shown. The 'Configuration' tab is active, displaying a table of parameters. 'servicesAvailable' is highlighted (step 3). At the bottom, the 'servicesAvailable' table structure is shown with columns: patAddress, protocol, startPort, endPort, serverAddress, serverPort (step 5).

Name	Value
patAddress	0.0.0.0
patPool	<Table>
portTranslations	<Table>
servicesAvailable	<Table>
addresses	<Table>
gateway	0.0.0.0
tcpSocketTimeOut	1d 0h 0m 0s
udpSocketTimeOut	0d 0h 3m 0s
tcpSockets	10000
udpSockets	10000
dmzHost	0.0.0.0
alg	<Struct>
tcpAdjustMss	disabled
accessPolicy	

Action	Argument Name	Argument Value
--------	---------------	----------------

configure DHCP private IP address range

- 1 enter option : 'ip' then 'router'
- 2 enter option(configuration) : 'dhcpDynamic'
- 3 Edit DHCP IP address range.

The screenshot shows the TMA configuration interface. On the left, the 'Containment tree' displays a hierarchy where 'ip' and 'router' are highlighted with a red box, labeled 'step 1'. On the right, the configuration table for '/router1623/ip/router' is shown. The 'dhcpDynamic' entry is highlighted with a red box, labeled 'step 2'. Below this, a table lists the DHCP dynamic configuration details, with the second row (index 2) highlighted by a red box, labeled 'step 3'.

Name	Value
sendPortUnreachable	enabled
sendAdminUnreachable	enabled
sendHostUnreachable	enabled
ripUpdateInterval	0d 0h 0m 30s
multicastRouting	enabled
sysSecret	
pppSecretTable	<Table>
dhcpStatic	<Table>
dhcpDynamic	<Table>
dhcpCheckAddress	disabled
dhcpCustomVendorId	
qualityMonitor	<Struct>
hosts	<Table>
defaultRoute	<Struct>

Index	ipcpSubnet	ipStartAddress	ipEndAddress	mask	gateway	interface	dnsSetting	nameServer	nameServer2	tftpServer	tftpServer2
1		192.168.14.100	192.168.14.200	255.255.255.0	0.0.0.0		learned	192.168.14.1	0.0.0.0	0.0.0.0	
2		192.168.15.100	192.168.15.200	255.255.255.0	0.0.0.0		learned	0.0.0.0	0.0.0.0	0.0.0.0	

PPPOE session configuration

If Vlan is not mentioned in Vlan Table means it configured as access.
 For Trunk port You need to add table and assign bridge and Vlan ID

The screenshot shows the TMA configuration interface for a PPPoE session. The 'Containment tree' on the left shows the path 'router1623' > 'ethernet1' > 'hwPort[2]'. The main configuration area shows the configuration for '/router1623/ethernet1/swPort[2]'. The configuration table lists various parameters for the session.

Parameter	Value
remark	
arp	<Struct>
bridging	<Struct>
vlanTagging	<Struct>
pam	<Struct>

For Broadband PPPOE interface configure username and password in PPPPE Client table like below.

The screenshot shows the TMA configuration interface. On the left, the 'Containment tree' displays a hierarchy of network components. The 'vpnBridgeGroup[BG_PPPoE]' entry is highlighted with a red rectangle. On the right, the configuration details for '/router1623/bridge/vpnBridgeGroup[BG_PPPoE]' are shown. The 'pppoEClient' entry is highlighted with a red rectangle, indicating it is the selected table for configuration.

Action	Argument Name	Argument Value
	alarmMask	00
	alarmLevel	<Struct>
	remark	
	mode	ipV6/ipV4
	ipV6	<Struct>
	arp	<Struct>
	spanningTree	<Struct>
	localAccess	permitted
	accessControl	<Struct>
	macAddress	<deviceMac> lan_1
	ip	<Struct>
	vlan	<Table>
	pppoEClient	<Table>
	snmpIndexOffset	0
	pppoEServer	

VLAN TagSignificance settings for MAC trough.

Sometimes we unblle to exchange the MAC address from NNI/UNI interface. You may change the TagSignificance set. It may affect customers Live service. Please take customer or call while doing the change.

do not make any chagnes for management Vlan you may loose the access of router.

The screenshot shows the TMA (Traffic Management Agent) interface. On the left, the 'Containment tree' displays a hierarchy: router1623 > ethernet1 > ethernet2 > hwPort[5] > hwPort[localPort] > port. The 'port' folder is selected. On the right, the configuration page for '/router1623/ethernet2/port' is shown. The 'vlan' configuration is highlighted, showing a table with columns: Action, Argument Name, and Argument Value. The 'vlan' configuration is set to 'global'. Below the configuration page, the 'vlan[2]/vlan' table is visible, showing a table with columns: vid, vidExtension, tpid, tagSignificance, changeTos, cosTosMap, cosMap, txCos, cosCosMap, tosCosMap, and queueCosMap. The 'tagSignificance' dropdown menu is open, showing options: local, global, sVlan, sVlanGlobal, cVlan, scVlan, and cVlanLocal.

vid	vidExtension	tpid	tagSignificance	changeTos	cosTosMap	cosMap	txCos	cosCosMap	tosCosMap	queueCosMap
1446	<single>	dot1Q	global	enabled	<Struct>	<Table>	1	<Struct>	<Table>	<Struct>

Policy configuration.

Policy configuration is always configured in SwPort for UNI interface and in Ethernet 2 for NNI interface. It will be configured for NeoInternet/NeoMetro/NeoVoice services.

The screenshot displays a network configuration interface. On the left, the 'Containment tree' shows a hierarchy: router1623 > ethernet1 > port > swPort[1]. The 'port' folder and 'swPort[1]' are highlighted with a red box. On the right, the configuration details for '/router1623/ethernet1/swPort[1]' are shown. The 'bandwidth' configuration is highlighted with a red box. Below the configuration details, a table shows the specific bandwidth settings.

Configuration	Status	Σ Perf
oam	<Struct>	
ipV6	<Struct>	
mode	bridging	
ip	<Struct>	
name		
bandwidth	<Struct>	
inboundBandwidth	<Struct>	
vlan	<Table>	
pppoEClient	<Table>	
pppoEServer		
adminStatus	up	

Action	Argument Name	Argument Val

bandwidth						
cir	eir	unit	tc	tcFactor	correction	maxFifoQLen
10240000	0	bits/sec	auto	ms	<Struct>	272

STEPS :-

Need to open web report on Cramer

Enter Service ID or Circuit Name (ServicePlanning Webreport)	
Serviceid :	027DURB1252009440561
Circuit Name :	
Submit	

Syrex (Pty) Ltd_NeoMetro_74069_027WOOD1802007327618			
Planning Project No.	Syrex (Pty) Ltd_NeoMetro_74069_027WOOD1802007327618	Service ID	027WOOD1802007327618
Customer Name	Syrex (Pty) Ltd	Affected Region/s	GAUTENG,GAUTENG
Customer Contact	NA	Customer e-mail ID	NA
P Planner	NILESH.NAIK_dis	Planning Date	2013-01-11 13:12:53.0
RF Planner	APARNA.OHOL_dis	SDM Ref (Rev Track ID)	74069
TX Planner	NA	OPICs Fiber Ref	1040
Voice Planner	NA	Satellite Planner	NA
MW Project Ref	NMWP-10-114		

Product Details				
Service Circuit Name	GDNSLEON0xxx04C_GKELBOON0xxx01C_L24Mxx_003_NEO (In Service)			
Product Name	Bandwidth	SLA	No of IP Address	No C
NeoMetro	4 Mbps	Economy (99%)	0	NA
Parent Service Type : Name : BW	NA : NA : NA			
LM Type (Primary)	IP, IP Radio		LM Type (Secondary)	IP

DEPENDENCIES & COMMENTS
10-04-2018 : Please upgrade service from 1 Mbps to 4 Mbps.LM is MW-P2P ///// old comments : 8/4/2015-----Primary link is connected to Gi3/32@172.16.2.4 and secondary link is connected to Gi0/24@172.30.45.137 for site A location. Also need to install Cisco 3400 12 port device at customer site A location. For site B location MPE model has been changed to APE model. Also vlan changed to 2859.

Now After checking above part, then check BS (Building Switch) IP is reachable or not,

BS 1 Information (Aend)			
BS Site Name	SYREX INTRANETS KELLOGS WOODMEAD	BS Cramer Name	GKELWOC3412A01B
BS Hostname	gkelwo3412a01b	Serial No.	NA
BS Port (NNI)	Gigabit Ethernet0/13(Gigabit Ethernet)	BS Port (UNI)	Gigabit Ethernet0/4(Gigabit Ethernet)
BS Management IP	172.30.12.160, 172.30.45.106	Software Port(UNI)	NA
BS Management VLAN	2,4_412, 2,1_405, 66,25_402		

```

gtstq01c9224d02a#show interfaces Gi0/0/18
GigabitEthernet0/0/18 is down, line protocol is down
Hardware is 24xGE-4x10GE-FIXED-S, address is 40ce.24e5.db12 (bia 40ce.24e5.db12)
Description: >>>.LINK_To_GWEEANZh426A02D_10.101.41.20<<<
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 BX100
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: 3441541
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
    11214809823 packets input, 3240048431070 bytes, 0 no buffer
    Received 4450638 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 0 multicast, 0 pause input
    9080286695 packets output, 8385502367275 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

```

```

gtstq01c9224d02a#show interfaces Gi0/0/21
GigabitEthernet0/0/21 is up, line protocol is up
Hardware is 24xGE-4x10GE-FIXED-S, address is 40ce.24e5.db15 (bia 40ce.24e5.db15)
MTU 1500 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 BX100
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 13w4d
Input queue: 0/375/0/0 (size/max/drops/flushes); Total output drops: 122
Queueing strategy: Class-based queueing
Output queue: 0/40 (size/max)
  30 second input rate 1383000 bits/sec, 167 packets/sec
  30 second output rate 72000 bits/sec, 75 packets/sec
    4440305226 packets input, 5131201682747 bytes, 0 no buffer
    Received 1105398 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    428 input errors, 1 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog, 821835 multicast, 0 pause input
    2703025258 packets output, 1224956348215 bytes, 0 underruns
    0 output errors, 0 collisions, 2 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

```

If AS Port which interfacing towards BS is up but no traffic, then it may be a fault of Configuration

	at POP end.								
	And then need to check MAC address is learning or not (both ends A end and Z end)								

```

gwphc3424a01a#sh mac address-table | i 1369
1369      c444.a0eb.7a71      DYNAMIC      Fa0/18
1369      c444.a0f9.fa56      DYNAMIC      Gi0/1
gwphc3424a01a#

```

Link Down Scenario

- 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;
- 2 computer with memory that manages the switching of the calls within the PBX and in
- 3 and
- 4 network of lines within the PBX;
- 5 unified communications (UC) router -- wireless and wired;
- 6 phone handset -- Universal Serial Bus (USB), VoIP and Session Initiation Protocol
- 7 VoIP
- 8 IP PBX;
- 9 internet router;

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.

Primary Rate Interface (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.

Data Flow Diagram

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design).

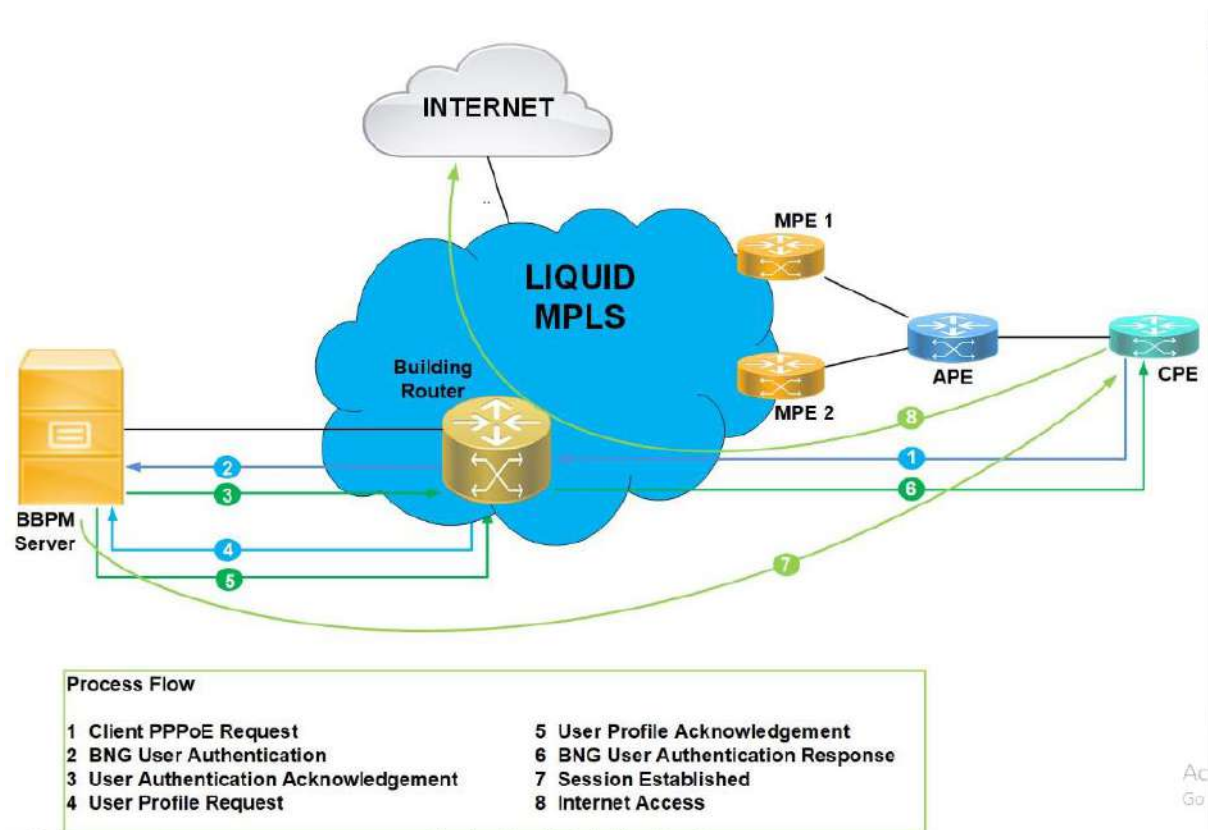
A DFD shows what kind of information will be input to and output from the system, how the data will advance through the system, and where the data will be stored. It does not show information about process timing or whether processes will operate in sequence or in parallel, unlike a traditional structured flowchart which focuses on control flow, or a

UML activity workflow diagram, which presents both control and data flows as a unified model.

A picture is worth a thousand words. A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both.

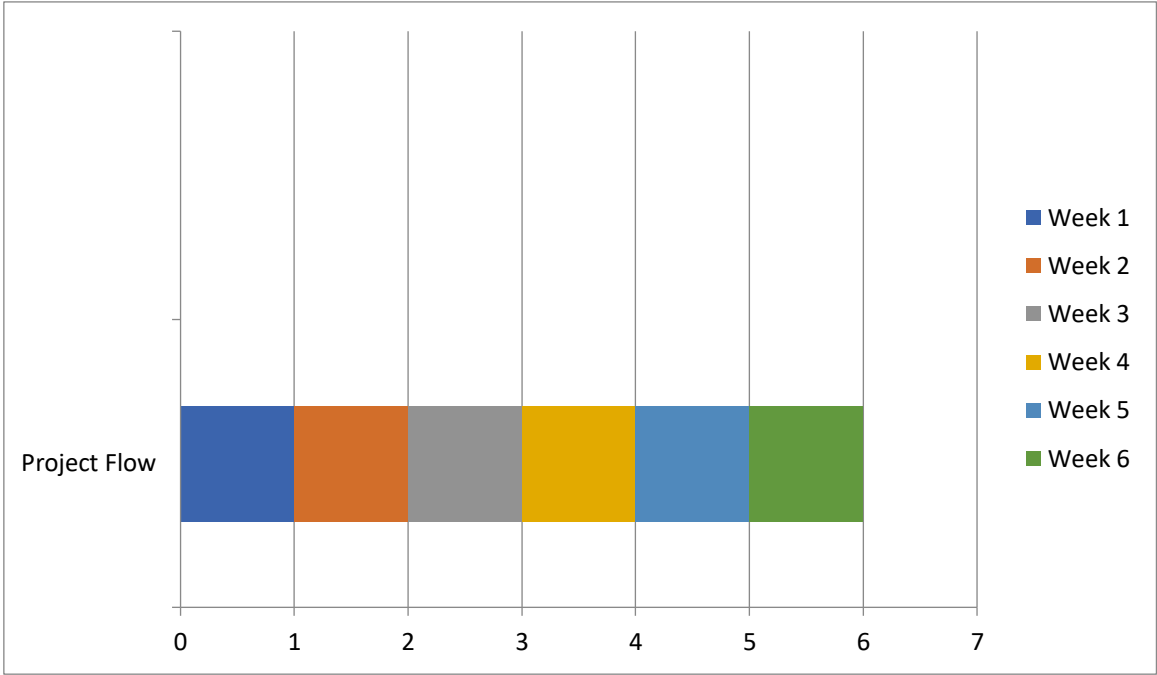
It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.

It is usually beginning with a context diagram as level 0 of the DFD diagram, a simple representation of the whole system. To elaborate further from that, we drill down to a level 1 diagram with lower-level functions decomposed from the major functions of the system. This could continue to evolve to become a level 2 diagram when further analysis is required. Progression to levels 3, 4 and so on is possible but anything beyond level 3 is not very common. Please bear in mind that the level of detail for decomposing a particular function depending on the complexity that function.



Ac
Go

Gantt Chart



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.

- **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.

1. 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.

Systems analysts are required to predict certain key variables before the proposal is submitted to the client. To some degree, a systems analyst will rely on a what-if analysis, such as, “What if labor costs rise only 5 percent per year for the next three years, rather than 10 percent?” The systems analyst should realize, however, that he or she cannot rely on what-if analysis for everything if the proposal is to be credible, meaningful, and valuable.

The systems analyst has many forecasting models available. The main condition for choosing a model is the availability of historical data. If they are unavailable, the analyst must turn to one of the judgment methods: estimates from the sales force, surveys to estimate customer demand, Delphi studies (a consensus forecast developed independently by a group of experts through a series of iterations), creating scenarios, or drawing historical analogies.

If historical data are available, the next differentiation between classes of techniques involves whether the forecast is conditional or unconditional. Conditional implies that there is an association among variables in the model or that such a causal relationship exists. Common methods in this group include correlation, regression, leading indicators, econometrics, and input/output models.

Unconditional forecasting means the analyst isn’t required to find or identify any causal relationships. Consequently, systems analysts find that these methods are low-cost, easy-to-implement alternatives. Included in this group are graphical judgment, moving averages, and analysis of time-series data. Because these methods are simple, reliable, and cost effective, the remainder of the section focuses on them.

- **Estimation of Trends**

Trends can be estimated in a number of different ways. One way to estimate trends is to use a moving average. This method is useful because some seasonal, cyclical, or random patterns may be smoothed, leaving the trend pattern. The principle behind moving averages is to calculate the arithmetic mean of data from a fixed number of periods; a three-month moving average is simply the average of the last three months. For example, the average sales for

January, February, and March is used to predict the sales for April. Then the average sales for February, March, and April are used to predict the sales for May, and so on.

When the results are graphed, it is easily noticeable that the widely fluctuating data are smoothed. The moving average method is useful for its smoothing ability, but at the same time it has many disadvantages. Moving averages are more strongly affected by extreme values than by using graphical judgment or estimating using other methods such as least squares. The analyst should learn forecasting well, as it often provides information valuable in justifying the entire project.

- **Tangible Costs**

The concepts of tangible and intangible costs present a conceptual parallel to the tangible and intangible benefits discussed already. Tangible costs are those that can be accurately projected by the systems analyst and the business's accounting personnel.

Included in tangible costs are the cost of equipment such as computers and terminals, the cost of resources, the cost of systems analysts' time, the cost of programmers' time, and other employees salaries. These costs are usually well established or can be discovered quite easily, and are the costs that will require a cash outlay of the business.

- **Intangible Costs**

Intangible costs are difficult to estimate and may not be known. They include losing a competitive edge, losing the reputation for being first with an innovation or the leader in a field, declining company image due to increased customer dissatisfaction, and ineffective decision making due to untimely or inaccessible information. As you can imagine, it is next to impossible to project a dollar amount for intangible costs accurately. To aid decision makers who want to weigh the proposed system and all its implications, you must include intangible costs even though they are not quantifiable.

1. 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?

- **Description:** Some archival and special collections have been catalogued for public use and contain detailed finding aids with descriptions about each item and the collection as a whole. Other collections may not have been reviewed and documented in detail and do not have much information on individual items. Those collections will require more time, human resources and significant additional expense to research the materials, check the accuracy of the information obtained, and write appropriate descriptions to aid in discovery and use of the digital items. Typewritten documents, like the Drew Pearson columns described above, can have reasonably accurate OCR applied to them to replace, for some uses, the detailed descriptions required for discovery of hand-written or picture materials. The selection criteria should clearly state whether the items and collections that do not contain descriptions should be considered for digitisation.
- **Human resources:** When selecting materials for digitisation, the library should consider whether it has the staff and skill sets to support the digitisation, metadata entry, user interface design, programming and search engine configuration that is required for the project to implement the desired functionality. For large collaborative projects, dedicated staff are usually required from each partner. Digital collections also require long-term maintenance, which needs to be considered and planned for. If a project does not have the necessary staff and skills in-house, but funding is available, outsourcing may be a good choice.

2. 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.

In our safe deposit example, three employees are more than 50 years old and have been with the bank over 14 years, four years of which have been in safe deposit. The remaining two employees are in their early thirties. They joined safe deposit about two years before the study. Based on data gathered from extensive interviews, the younger employees want the programmable aspects of safe deposit (essentially billing) put on a computer. Two of the three older employees have voiced resistance to the idea. Their view is that billing is no problem. The main emphasis is customer service-personal contacts with customers. The decision in this case was to go ahead and pursue the project.

3. 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

An example of an operational feasibility study, or the fourth type, analyzes the inside operations on how a deemed process will work, be implemented, and how to deal with change resistance and acceptance.

Operational feasibility studies are generally utilized to answer the following questions:

- **Process** – How do the end-users feel about a new process that may be implemented?

- **In-House Strategies** – How will the work environment be affected? How much will it change?
- **Adapt & Review** – Once change resistance is overcome, explain how the new process will be implemented along with a review process to monitor the process change.

If an operational feasibility study must answer the six items above, how is it used in the real world? A good example might be if a company has determined that it needs to totally redesign the workspace environment.

After analyzing the technical, economic, and scheduling feasibility studies, next would come the operational analysis. In order to determine if the redesign of the workspace environment would work, an example of an operational feasibility study would follow this path based on six elements:

- **Process** – Input and analysis from everyone the new redesign will affect along with a data matrix on ideas and suggestions from the original plans.
- **Evaluation** – Determinations from the process suggestions; will the redesign benefit everyone? Who is left behind? Who feels threatened?
- **Implementation** – Identify resources both inside and out that will work on the redesign. How will the redesign construction interfere with current work?
- **Resistance** – What areas and individuals will be most resistant? Develop a [change resistance plan](#).
- **Strategies** – How will the organization deal with the changed workspace environment? Do new processes or structures need to be reviewed or implemented in order for the redesign to be effective?
- **Adapt & Review** – How much time does the organization need to adapt to the new redesign? How will it be reviewed and monitored? What will happen if through a monitoring process, additional changes must be made?

The most important part of operational feasibility study is input—from everyone, especially when it affects how or what an organization does as far as processes. If the process were to build a new sports arena for a client, then a study determining how the arena will operate in a way that is conducive to its inhabitants, parking, human flow, accessibility and other elements is a good example of an operational feasibility study.

Create a [sample operational feasibility study](#) if you plan to change something inside the company that will affect how the organization runs or when a client asks you to explore a new product or process that will affect elements within their own organization.

Test Case

- **BLACK BOX TESTING :-**

The technique of testing without having any knowledge of the interior workings of the application is called blackbox testing. The tester is oblivious to the system architecture and does not have access to the source code. Typically, while performing a blackbox test, a tester will interact with the system's user interface by providing inputs and examining outputs without knowing how and where the inputs are worked upon.

- **WHITE BOX TESTING:-**

Whitebox testing is the detailed investigation of internal logic and structure of the code. Whitebox testing is also called glass testing or openbox testing. In order to perform whitebox testing on an application, a tester needs to know the internal workings of the code.

- **GREY BOX TESTING:-**

Greybox testing is a technique to test the application with having a limited knowledge of the internal workings of an application. In software testing, the phrase the more you know, the better carries a lot of weight while testing an application.

- **UNIT TESTING:-**

Unit Testing contains the testing of each unit of Recruitment Application. We have tested each interface by input values and check whether it is working properly working or not we also tested database connectivity. We have entered value in interface and check that the values are properly goes to corresponding tuples or not.

- **INTEGRATION TESTING:-**

Integration testing is defined as the testing of combined parts of an application to determine if they function correctly. Integration testing can be done in two ways: Bottomup integration testing and Topdown integration testing.

- **SYSTEM TESTING:-**

System testing tests the system as a whole. Once all the components are integrated, the application as a whole is tested rigorously to see that it meets the specified Quality Standards. This type of testing is performed by a specialized testing team.

- **ACCEPTANCE TESTING:-**

This is arguably the most important type of testing, as it is conducted by the Quality Assurance Team who will gauge whether the application meets the intended specifications and satisfies the client's requirement. The QA team will have a set of prewritten scenarios and test cases that will be used to test the application. In System Testing we have tested entire Recruitment Application. We have run all programs as a single system and inputs various test cases and analyse that all are going correctly or not. In system testing we have tested various test cases. According to which, Application showed the corresponding error message

Conclusion

The package was designed in such a way that future modifications can be done easily.

Automation of the entire system improves the efficiency.

It provides a friendly graphical user interface which proves to be better when compared to the existing system.

It gives appropriate access to the authorized users depending on their permissions.

A software project means a lot of experience. We learned a lot through this project. This project has sharpened our concept game engine, animation, and the software-hardware interface. We learned a lot about different documentation. Now I have much wider knowledge of the features Java offers and put into practice various object-oriented methods that learnt last semester.

Literature Riview

Abstract

Cloud computing is the most common technology transformation since the introduction of the Internet in the early 1990s. As more and more organisations and educational institutions plan to adopt a cloud-based IT infrastructure, today's job market requires IT professionals. we discussed the protocols in each layer of the Transmission Control Protocol/Internet Protocol (TCP/IP) architecture. In this chapter, we will first explore various types of networks. We will examine network devices and network media. We will also take a closer look at network interface cards (NICs), switching devices, and network routing devices. We will see how these devices are put together to physically construct a network. [1] The amount of data being generated, processed, and stored has reached unprecedented levels. Even during the recent economic crisis, there has been no slow down or information recession. Instead, the need to process, move, and store data has only increased. Consequently, IT organizations are looking to do more with what they have while supporting The more space you have, the more it seems to get filled up. – Greg Schulz

- Storage (hardware, software, and management tools) • Block, file, direct attached, networked, and cloud storage • Input/output, networking, and related convergence topics
- Public and private cloud products and services • Virtualization (applications, desktop, server, storage, and networking)
- Risks and security challenges for cloud, virtual, and data storage networks • Security should be effective without being a barrier to productivity • Techniques, technologies, and best practices for securing information resources

This chapter looks at securing data infrastructure resources in cloud, virtual, networked, and storage environments to counter various internal and external threat risks and other security-related challenges. A good defines-having multiple layers, rings, or lines of protection-along with a strong offense of proactive policies combine to enable productivity while protecting resources. [2]

10.1 Introduction

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.

Recently, with the exponential surge of energy consumption in wireless communication, green communications have received much attention from both industry and academic. As a promising technology towards green communications, harvesting the ambient radiofrequency (RF) energy can prolong the lifetime of energy-constrained wireless networks. More importantly, scavenging energy from the far-field RF signal transmission enables simultaneous wireless information and power transfer (SWIPT). SWIPT systems where a transmitter serves two kinds of receivers, i.e., information decoding receivers (IRs) and energy harvesting receivers (ERs). Based on this scenario, joint information beamforming for IRs and energy beamforming for ERs were investigated [3]

10.2 Related Work

Fieldbus and Networking in Process Automation discusses the newest fieldbuses on the market today, detailing their utilities, components and configurations, wiring and installation methods, commissioning, and safety aspects under hostile environmental conditions. This clear and concise text:

- Considers the advantages and shortcomings of the most sought after fieldbuses, including HART, Foundation Fieldbus, and Profibus
- Presents an overview of data communication, networking, cabling, surge protection systems, and device connection techniques
- Provides comprehensive coverage of intrinsic safety essential to the process control, automation, and chemical industries
- Describes different wireless standards and their coexistence issues, as well as wireless sensor networks
- Examines the latest offerings in the wireless networking arena, such as WHART and ISA100.11a

Offering a snapshot of the current state of the art, **Fieldbus and Networking in Process Automation** not only addresses aspects of integration, interoperability, operation, and automation pertaining to fieldbuses, but also encourages readers to explore potential applications in any given industrial environment. [4]

In a world in a constant need for development, preserving biodiversity is a daunting task for both governments and NGOs. The centrepiece of successful biodiversity conservation is ensuring cooperation among countless actors involved in the management of protected areas. Social network analysis is a suitable tool for securing essential information for interactions during the management process. To contribute to the debate in the field of governance of protected areas, we illustrate an approach in investigating management of Natura 2000 sites, by considering two real-world management settings in Romania. [5]

10.3 Graphical user Interface

Nowadays the Internet is exposed to a span of web threats. In the modernized era, multifarious types of attacks are discovered on the Internet, along with the utmost disastrous attack, Distributed Denial of Service (DDoS) attacks. In such course of attacks, an immense number of settle arrangement tie in with one another to make the services baseless for honest users. These composed systems frequently mask their existence by counterfeit technique. IP traceback is a way used to catch the real path of web packets in such scenario.

10.4 Discussion

The concepts, techniques, and strategies discussed in this book are ideal for students, educators, and security practitioners looking for a clear and concise text to avant-garde cyber security installations or simply to use as a reference.

Hand-on labs and lecture slides are located at <http://virtualnetworksecurity.thothlab.com/>.

Features

- Discusses virtual network security concepts
- Considers proactive security using moving target defense
- Reviews attack representation models based on attack graphs and attack trees
- Examines service function chaining in virtual networks with security considerations
- Recognizes machine learning and AI in network security [9]

The growing demand for electrical energy by customers has created new challenges in the management and control area. In the past, as the energy consumption was moderate, only basic equipment was needed to manage the electricity grid.[10]

we explore the impacts of the WiFi signal strengths under normal signal conditions on the energy consumption of smartphones. Controlled experiments are conducted to quantitatively study the phone energy impacts by normal WiFi signals.[11]

10.5 Conclusion

A direct application of generic machine learning packages does not adequately highlight these critical performance regions or provide as precise confidence estimates.[12] Those that take inspiration from nature for the development of novel problem solving techniques and Those that employ natural materials to compute or communicate[13]

this trend in communications engineering, taking into account three specific areas—vehicular, device-to-device (D2D), and cognitive radio—while describing the opportunistic communication methods of each.[14] The purpose of this paper is to compare two estimation methods when identifying the coefficients of the Simplified Volterra Series (SVS) model, in order to linearize a class AB GaN Power Amplifier (PA) driven by a 20-MHz LTE-A signal.

A working definition of network science is the study of network representations of physical, biological, and social phenomena leading to predictive models of these phenomena. Initiation of a field of network science would be appropriate to provide a body of rigorous results that would improve the predictability of the engineering design of complex networks and also speed up basic research in a variety of applications areas [15]

References

[1] Professional WPF Programming: .NET Development with the Windows Presentation Foundation

Author	<u>Chris Andrade, Shawn Livermore, Mike Meyers, Scott Van Vliet</u>
--------	---

[2] “.NET 3.5 Programming Black Book covering .NET Framework VB 2008, C# 2008 and ASP.NET 3.5

Author	<u>Kogent Learning Solutions Inc.</u>
--------	---

[3] “Unified platform for the delivery of notifications” Carpathian Control Conference (ICCC), 2012 13th International. Mojziso, A. Inst. of Control & Informatization of Production Processes, Tech. Univ. of Kosice, Kosice, Slovakia Mojzis, M.

[4] “An improvement of the shortest path algorithm based on Dijkstra algorithm “Computer and Automation Engineering (ICCAE), 2010 The 2nd International Conference on (Volume:2). Ji-xian Xiao Coll. of Sci., Hebei Polytech. Univ., Tangshan, China Fang-Ling Lu.

[5] Software Design: From Programming To Architecture

Author	<u>Eric J. Braude</u>
--------	---------------------------------------

[6] Software Testing and Quality Assurance- Theory and Practice

Author	<u>Kshirasagar Naik, Priyadarshi Tripathy</u>
--------	---

