Department of Computer Science & Engineering
SOUTHEAST UNIVERSITY

Internship Report
on
Network Infrastructure Activities of Sonali Bank Limited

A Dissertation Submitted to the Southeast University in Partial Fulfillment of the Requirements for the Degree of B. Sc. in Computer Science & Engineering

Submitted by

Habibur Rahman
ID: 2017100000060
Batch: 46

Supervised by

Mohammad Ashraful Hoque
Lecturer and Coordinator
Department of CSE
Southeast University

February, 2022

Letter of Transmittal

February 20, 2022
The Chairman,
Department of Computer Science & Engineering,
Southeast University,
Banani, Dhaka.

Through: Supervisor, Mohammad Ashraful Hoque

Subject: Submission of Internship report

Dear Sir,

I am pleased to present my internship work on "Network Infrastructure Activities of Sonali Bank Limited" This internship allowed me to have a thorough understanding of Sonali Bank Limited's networking architecture. With a few exceptions, I have done my best to put together this report.

The internship has allowed me to put the academic information I've gained from you and other SEU faculty members in a real-life context, which will benefit me in the future.

Thank you.

Sincerely yours,

Habibur Rahman
ID: 2017100000060
Batch: 46
Program: CSE

Supervisor:

Mohammad Ashraful Hoque
Lecturer and Coordinator
Department of CSE
Southeast University

Certificate

This is to certify that Habibur Rahman has submitted the report Network Infrastructure Activities of Sonali Bank Limited in partial fulfillment of the requirements for the award of a bachelor's degree (BSc. in CSE) from Southeast University's Department of Computer Science and Engineering.Habibur Rahman, ID: 2017100000060, conducted a record analysis under our direction. The internship report was not used for any other degree, and the student's performance was deemed adequate.

I wish him the best of luck in his future endeavors.

Supervisor:

Mohammad Ashraful Hoque
Lecturer and Coordinator
Department of CSE
Southeast University

Co-Supervisor:

Chandan Kumer Podder
Senior Engineer (IT)
Sonali Bank Limited
Head Office Branch, Dhaka

Executive Summary

The Internship program was begin with Sonali Bank Limited's IT Division under the direction of **Chandan Kumer Podder, Senior Engineer (IT) Sonali Bank Limited**, after receiving approval from Southeast University (SEU). This report is based on a three-month internship at Sonali Bank Limited's Head Office, which I successfully completed. My internship, which is a requirement of my CSE curriculum, began on November 9th, 2021. As an understudy, I had the opportunity to establish long-term beneficial connections with dependable clientele. They've always improved their tactics to accomplish their goals in order to do this.

Later, the administration structure, several offices, research techniques, and the report's objectives were discussed. Following that, the report's findings and limits are reviewed, and the solutions to those problems are looked at in the last section. This report is divided into several components and organized in a grouping. The report begins with an overview and foundation of Sonali Bank Limited, as well as an overview of Bangladesh's networking system.

My internship's primary goal is to learn about Sonali Bank's network structure and how it operates, as well as network troubleshooting, wire and wireless LAN installation for Provisioning. MZ, DMZ, Campus Area Network, also introduced with various OEM like Routers, Switches, and Firewalls were all used to build the network. I used VISIO software to design the bank network infrastructure see how the network worked. I demonstrated the network's design and configuration using the Cisco Packet Tracer and used Visio software for visualization.

Acknowledgements

First of all, I want to express my heartfelt gratitude to Almighty Allah for all that he has done for me. I'd want to express my gratitude to my parents and everyone else who has helped me to complete the Internship program successfully, as well as those who helped me writing my report. I was assigned to Sonali Bank Limited, as part of the internship program. With the support of my internal supervisor, I learnt and concentrated on how my company operates throughout this period.

subsequently, I'd want to express my gratitude to **Mohammad Ashraful Hoque** (Lecturer and Coordinator, Department of Computer Science and Engineering, SEU) for leading me through this internship program with a great deal of work and time.

In particular, I'd like to express my gratitude to **Chandan Kumer Podder, Senior Engineer (Information Technology Division) Sonali Bank Limited**, who assisted me greatly in preparing my internship report **Network Infrastructure Activities of Sonali Bank Limited** by providing valuable suggestions whenever necessary. They also allow me to be the front-runner on this topic.

Finally, I'd want to thank the rest of Sonali Bank Limited's IT Division (Infrastructure IT). They adviced me on how to work and what procedures to follow in order to perform effectively, as well as how to improve my internship report. They aided me in a variety of ways by allowing me to receive whatever support I required. I wouldn't have been able to finish my paper otherwise.

Contents

List of Tables

List of Figures

Chapter 1

Introduction

1.1 About Sonali Bank Limited

Following Bangladesh's independence, Order 1972 (Presidential Order-26) Bank nationalization, which liquidated the then National Bank of Pakistan, Premier Bank, and Bank of Bhwalpur, established 'Sonali Bank Limited' as the country's one of the substantial and national commercial bank. The bank had been fulfilling its national building tasks as a completely state-owned institution by executing government entrusted varied social economic programs plus money market activities for their own initiative, spanning all aspects of the economy.

From November 15, 2007, the bank was transformed to a Public Limited Company with 100 percent government ownership and began operating as 'Sonali Bank Limited', taking over all of Sonali Bank's assets, liabilities, and business. [1]

A Board of Directors comprising 11 members governs Sonali Bank Limited. The CEO and Managing Director of the Bank is a well-known banker and reputable professional. The bank's headquarters situated in Motijheel, Dhaka, Bangladesh. Authorized Tk. 6000.00 Crore and Paid-up Tk. 4530.00 Crore are the capital structures of Sonali Bank. SBL has a large number of branches, including: 1228 branches altogether (Foreign branches are 2 and Local branches are 1226). Rural branches number 726, with 500 urban branches. There are 16 regional offices.

There are 46 principal offices and 11 general managers office.

Fig: 1.1

Figure 1.1: Sonali Bank Limited Logo

SBL has subsidiaries in the United States of America including Sonali Exchange Company Incorporated (SECI), which has 10 branches. Sonali Investment Limited (Merchant Banking) has four locations in Dhaka (Motijheel, Paltan, Uttara, and Mirpur) as well as one in Khulna. In the United Kingdom, Sonali Bank (UK) Limited operates two locations. The representative of Sonali Polaris FT Limited has three offices: two in Saudi Arabia (Jeddah, Riyadh) and a third in Kuwait. [2]

1.1.1 Vision

Socially committed leading banking institution with global presence.

1.1.2 Mission

Dedicated to extend a whole range of quality products that support divergent needs of people aiming at enriching their lives, creating value for the stakeholders and contributing towards socio-economic development of the country.

1.1.3 Slogan

Your trusted partner in innovative banking.

1.1.4 Services of Sonali Bank Limited

- Agent Banking
- SMS Banking
- Ancillary Service
- Locker
- Online Tax Payment Procedure
- Automation Status
- NBR - Sonali Bank e-Payment
- ATM Services
- ATM Location

1.2 Objective of the Internship

The main goal of an internship is beneficial for both the company and myself, an intern may gain practical knowledge and talents while improving curriculum vitae. However, I can define my objective as:

- Meeting the internship program's requirements
- Employment experience in a field linked to studies
- Professional growth and control of performance
- Close observation of IT team what are they do in SBL

1.3 Scope and Methodology

1.3.1 Scope of the Study

The Sonali Bank Limited Head Office in Motijheel, Dhaka was allocated for the scope of the study, and it provided me with my first experience in such a large

banking network infrastructure environment in Bangladesh.

1.3.2 Methodology of the study

Following certain rules and processes is required for the correct and efficient execution of research activity. Rules were followed to simplify the data collecting procedure. The information and data analysis are used to determine the research's accuracy.

- We can define our Sources of data by two ways:

- Primary Sources:

1. Discussions with executives in IT team
2. Exploring the division, observing their problem
3. Practical work with network Infrastructure

- Secondary sources:

1. SBL's yearly reports.
2. Resources collected from the internet.
3. Websites, online pdf, and newsletters are also important sources of information, etc.

Chapter 2

Literature Review

A literature review is one of the most important responsibilities for any researcher since it aids in their direction. Its purpose is to provide us with the necessary knowledge base as well as the opportunity to learn about easily available resources and solutions. It also helps with the creation of fresh ideas and the selection of suitable design solutions. The company's goal for us was to learn about fundamental networking while also understanding its infrastructure. Even though we had some academic and practical understanding of the topic, it was quite simple to socialize with the setting. It had a really professional feel about it. It will be simple to adjust to and work within the IT company's environment in the future. However, as time passed, we improved and were able to do our tasks properly. We had to accomplish our tasks at Sonali Bank Limited logically and systematically so that if we work on a project in the future for this company or any other company then we can work professionally.

Chapter 3

Details of Internship Work

3.1 My work activities, Place, Supervisor and Time Table

In Sonali Bank Limited's Information Technology Division, I worked at IT Division (Infrastructure IT). They treated me as though I were one of their workers. From Sunday through Thursday, my intern schedule was 10:00 a.m. to 4:00 p.m. My internship began on November 9th, 2021, and concluded on February 15th, 2022. Chandan Kumer Podder has always been very supportive of me, and other colleagues have also assisted me.

My overall internship supervisor, Mohammad Ashraful Hoque sir, set an example of worth by assisting me. They taught me a lot of things throughout my internship, which I really enjoyed:

- Network Troubleshooting.
- Making Ethernet Cables and checking connections.
- Implementing Routing Protocols

3.2 Introduction of Basic networking

Networking is the process of exchanging information between communication devices.

3.2.1 Network Topology

Topology refers to the arrangement of a network's links and nodes. Topologies are either physical or logical. [3]

Fig: 3.1

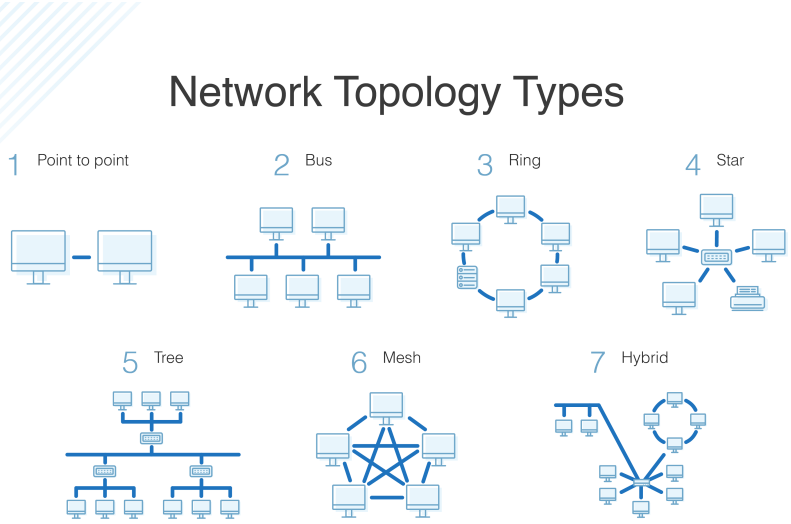

Figure 3.1: Type of Network Topology

3.2.2 Types of Network

LAN: Locally or internally connected and exchange data, information or something else with them-self is called LAN. [4]

Fig: 3.2

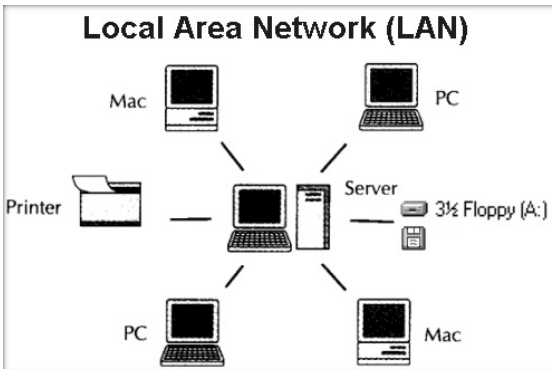

Figure 3.2: Local Area Network

MAN: MAN is a bigger area than a LAN but a lesser area than a WAN. It may communicate each other in a different location. Internet providers and a big territory are user of MAN. [4] Fig: 3.3

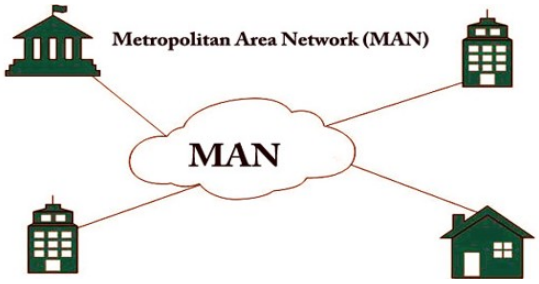

Figure 3.3: Metropolitan Area Network

WAN: The widely connected network that communicates in the topographical region of. But the fact is, it may be a single portion of the site or territory. [4] Fig: 3.4

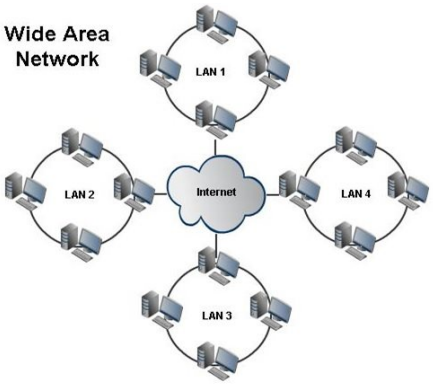

Figure 3.4: Wide Area Network

3.2.3 OSI Model

An open system interconnection model is a model that reveals how a communication device communicates through an internal structure. There is some rules and regulations state of the OSI model which is seven layers. And the layers are:: [5] Fig: 3.5

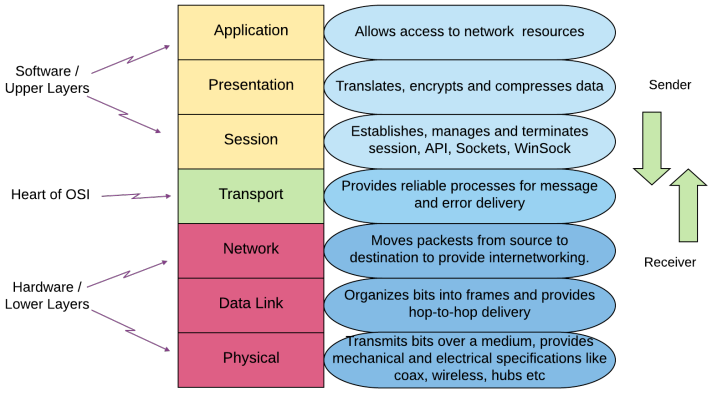

Figure 3.5: OSI Model

Layer 1 - (Physical Layer): Data will be transmitted from one device to another by any method by confirming the physical layer. Data can be viewed in electrical signal or data bit format. Example: Hub

Layer 2 - (Data Link Layer): Transmitting data diagrams from 1 device to another device via physical layer without any errors. Creates logical links with that 2 devices. This layer converts data into frames.

Layer 3 - (Network Layer): Done addresses and packet delivery. Data packets provide network addresses, use routers through encapsulation, and create routing tables.

Layer 4 - (Transport Layer): Data collected from the session layer and sent to the other devices nice way. We can say Transport Layer is âHeart of OSIâ. Example: TCP, UDP

Layer 5 - (Session Layer): Connecting between source and destination. Example: Simplex, Half-Duplex, Full-Duplex

Layer 6 - (Presentation Layer): By doing data convention and data

conversion. Example: jpg, png, CSV.

Layer 7 - (Application Layer): Provides user interface. Example: FTP (File transfer protocol).

3.2.4 IP address

When mail or message are sent from one device to another, some rules or formats are used to specifically identify them-self that's Internet Protocol. For example, 192.168.0.1. Also, there are two versions, one is Ip version 4 which means IPv4, and IP version 6 which means Ipv6.

IPv4:

- Specially 3 classes = A, B, C
- 4 octets (each octet contain 8 bits) that means 32 bits

IPv6:

- 128 bits
- Each octet contains 8 bits with hexadecimal number
- 16 parks
- Last 64 bits host
- Prerfix 48 bit
- 8 blocks

■ Here is the Details of IPv4 :

Bits	Range	8bits	8bits	8bits	8bits	Subnet Mask
Class A	1-126	NetWork	Host	Host	Host	255.0.0.0
Class B	128-191	Network	Network	Host	Host	255.255.0.0
Class C	192-223	Network	Network	Network	Host	255.255.255.0
Class D		Multicast				
Class E		Research				

Table 3.1: All Classes and details of IP

CIDR	Subnet Mask	Host/Subnet
/24	255.255.255.0	256
/25	255.255.255.128	128
/26	255.255.255.192	64
/27	255.255.255.224	32
/28	255.255.255.240	16
/29	255.255.255.248	8
/30	255.255.255.252	4
/31	255.255.255.254	2
/32	255.255.255.255	1

Table 3.2: Subnetting chart

For example, Now showing IP calculation of 192.168.100.5/26 (Which is belongs to Class C) :

Details	Details	8bits	8bits	8bits	8bits
Address	192.160.100.5/26	11000000	10100000	01100100	00 000101
Subnetmask	255.255.255.192 = 26	11111111	11111111	11111111	11 000000
Wildcard mask	0.0.0.63	00000000	00000000	00000000	00 111111
Network	192.160.100.0/26	11000000	10100000	01100100	00 000000
Broadcast	192.160.100.63	11000000	10100000	01100100	00 111111
Host Minimum	192.160.100.1	11000000	10100000	01100100	00 000001
Host Maximum	192.160.100.62	11000000	10100000	01100100	00 111110
Host/Net	62				

Table 3.3: IP Calculation

3.2.5 VLAN

Virtually connected to the exchange of information or data that is separated occurs at the second level of the computer network layer. Fig: 3.6

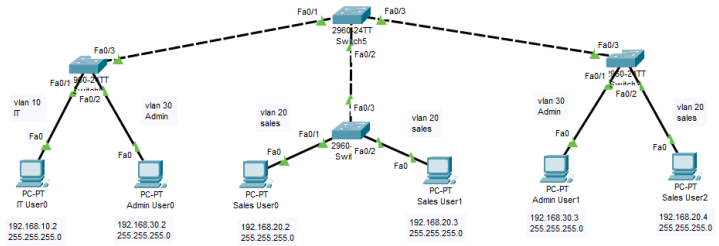

Figure 3.6: VLAN

3.2.6 ACL (Access Control List)

The access control list comprises various rules that give or restrict access to specific environments, indicating whether they wish to travel that route or not. Fig: 3.7

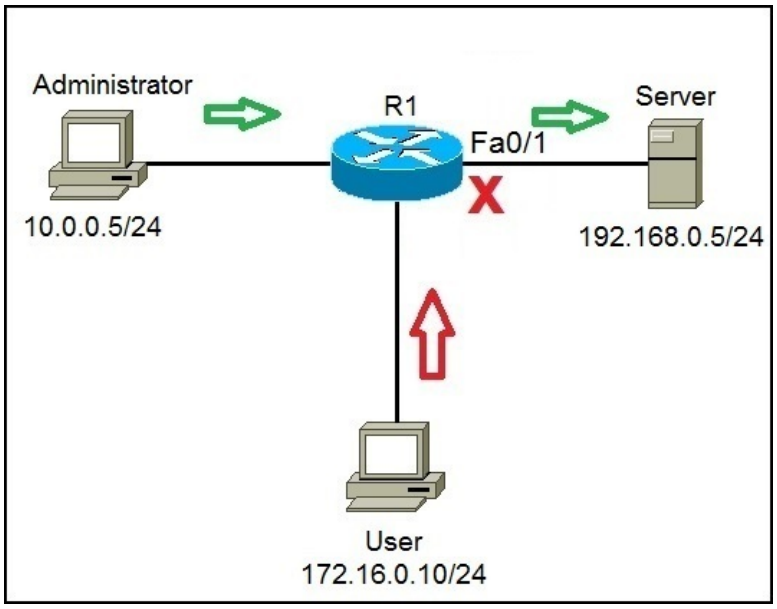

Figure 3.7: ACL

3.2.7 NAT (Network Address Translation)

Network address translation is the process of converting a device's IP address information from private to public. Fig: 3.8

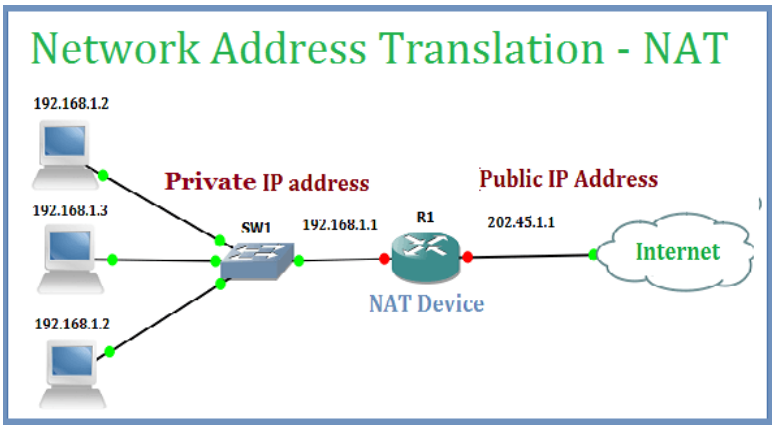

Figure 3.8: NAT

3.2.8 Routing Protocol

There are some rules that how routers are connected with one another to distribute their data. Static, Dynamic, Default are 3 types of routing protocol. Some of the dynamic routing protocol are -

- Routing information protocol version 1 (RIP-1)
- Routing information protocol version 2 (RIP-2)
- Open shortest path first (OSPF)
- Border gateway protocol (BGP)
- Enhanced interior gateway routing protocol (EIGRP)
- Interior gateway routing protocol (IGRP)
- Intermediate system to intermediate system (IS-IS)

Fig: 3.9

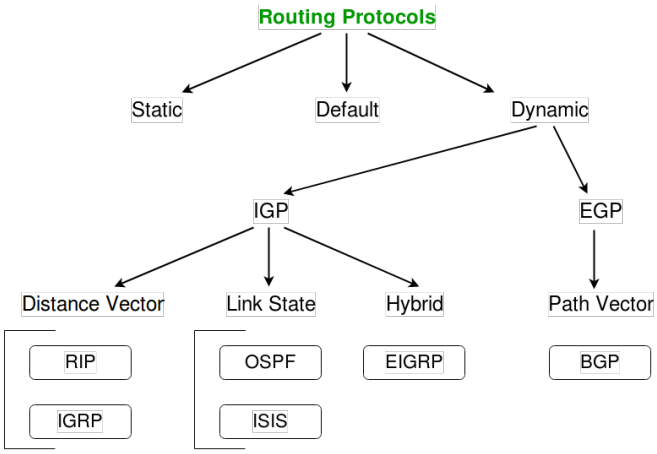

Figure 3.9: Type of Routing Protocol

3.2.9 VPN (Virtual Private Network)

VPN is a way to connect with a private to a public network. client transfer their data and obtain their data as if their devices are connected. Fig: 3.10

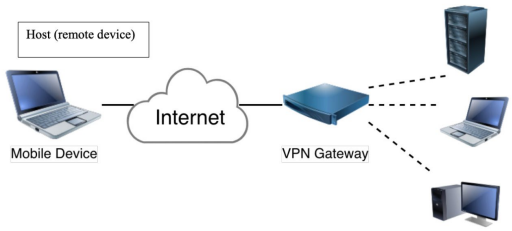

Figure 3.10: VPN

3.2.10 GRE Tunnel

It is a Cisco Systems tunneling protocol that may encapsulate a wide range of network layer protocols inside virtual point to point or point to multipoint lines across an IP network. Fig: 3.11

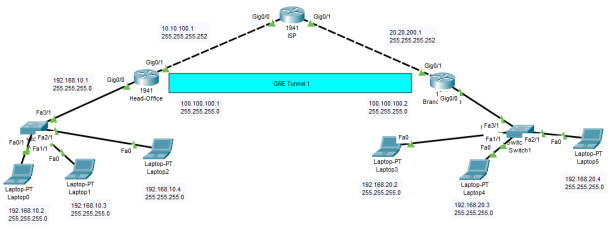

Figure 3.11: GRE Tuneel

3.2.11 IPSec

It is a secure network protocol that encrypts their data for highly secured transfer between two devices over an IP network. Fig: 3.12

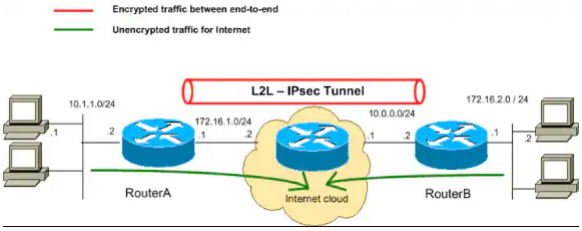

Figure 3.12: IPSec

3.2.12 Crypto Map

A crypto map is a software configuration item that performs selected data flows that require security processing and specifies the policy for these flows as well as the crypto peer to whom the traffic must be routed.

3.3 Events and Activities

Some of the key activities that I did in Sonali Bank Limited:

3.3.1 Making Ethernet Cables

One of the most common system connection types in wired systems is the Ethernet connection. Ethernet connects devices such as PCs and switches

in a area. When there is a problem occurs in the PC of a division they inform the infrastructure division then we go to that division, observe their problem, see how we can solve their problem, if there is a problem of cabling we make a new cable change it. Cable is in the physical layer, they have boundaries, both in terms of how far they can stretch and still carry valid signals and in terms of their resilience. This is one of the reasons why there are several types of Ethernet connections, each with its own set of fault circumstances. Cat 5, 5e, 6, 6a, 7 and 8 connection are among the most commonly used cables. There are 2 types of cable making first one is straight cabling and the other is crossover cabling, but in SBL I have done to make Straight cabling. Fig: 3.13

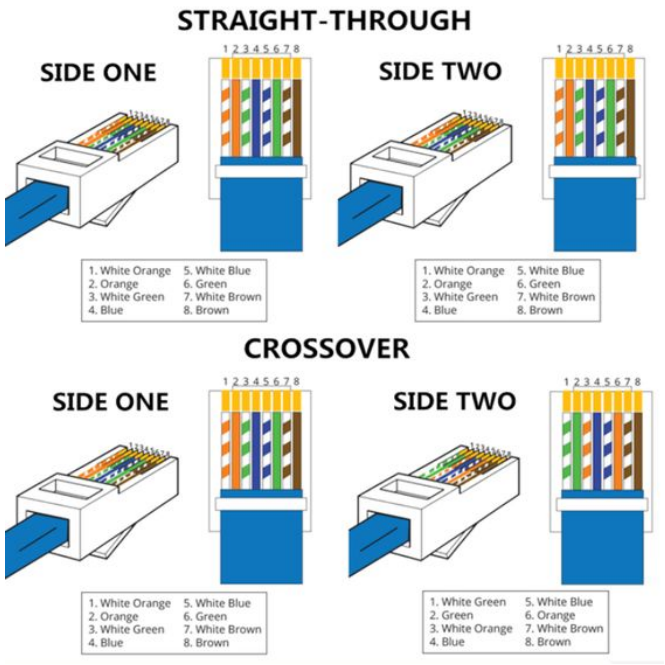

Figure 3.13: Straight-Through and Crossover Cabling

3.3.2 Networking Devices

Switch: Switch is layer-2 device. It's connect one communication device to another communication device with cable and transfer data or information. Fig: 3.14

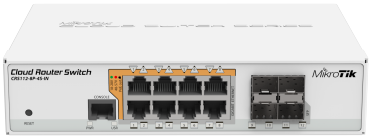

Figure 3.14: Switch

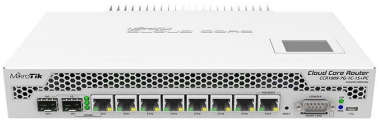

Figure 3.15: Router

Router: Router is layer-3 device. It's used for transferring data or information with one communication device to other communication device. Fig: 3.15

Firewall: Firewall is layer-3 and layer-4 device. It's like a shield, and it's provide us protection from bad things for devices such as virus, malware. Fig: 3.16

Figure 3.16: Firewall

3.3.3 Troubleshooting

- We undertake some troubleshooting if we can't find an issue with the cabling. There are some of the issues, that issues are done in Command Prompt:

Fig: 3.17, 3.18, 3.19

Figure 3.17: ipconfig troubleshooting

Figure 3.18: getmac troubleshooting

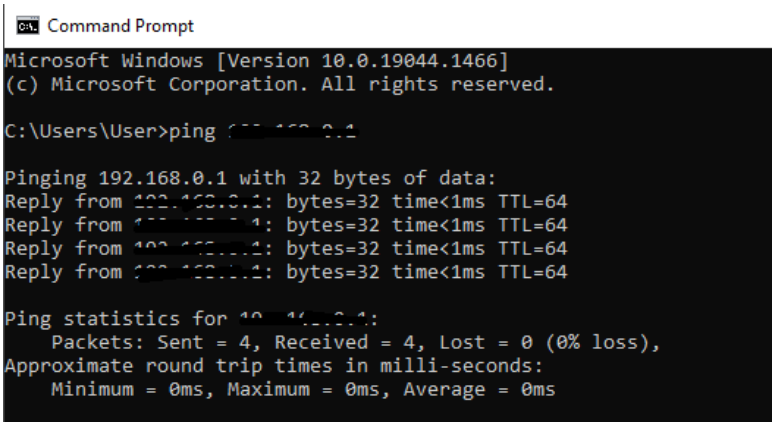

Figure 3.19: ping troubleshooting

- There are some others tools used for troubleshooting. They are NMAP, Packet Sender, Wireshark:

Fig: 3.20, 3.21, 3.22

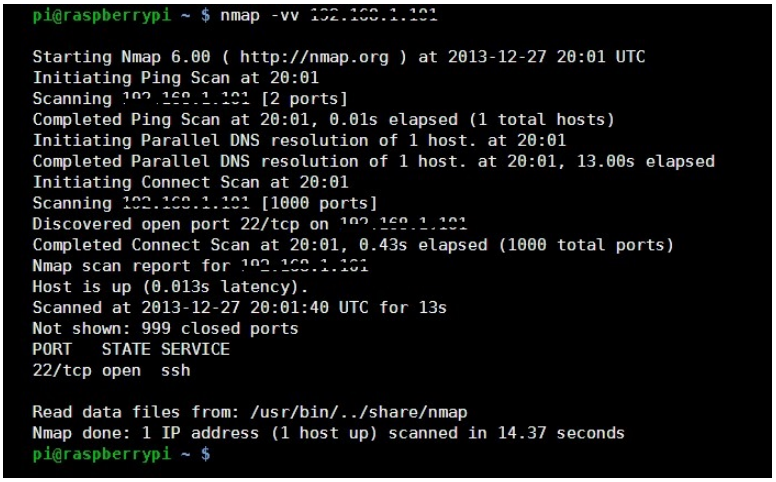

Figure 3.20: NMAP Troubleshooting

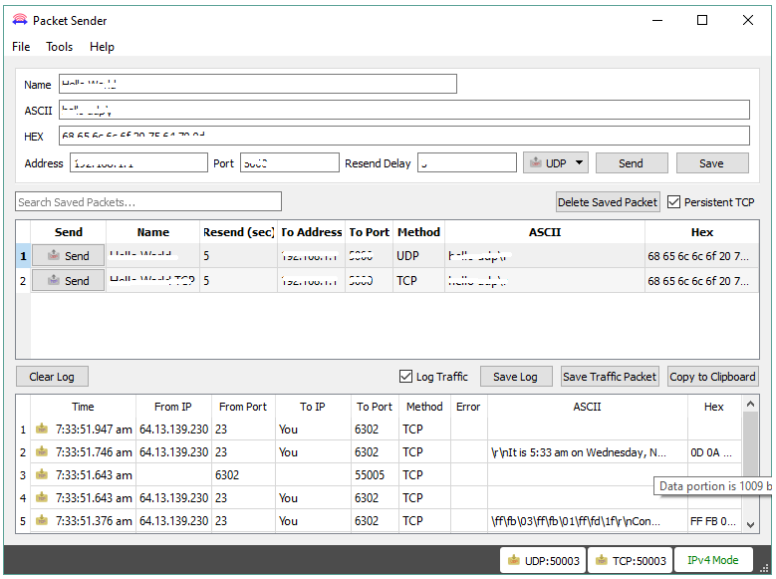

Figure 3.21: Packet Sender Troubleshooting

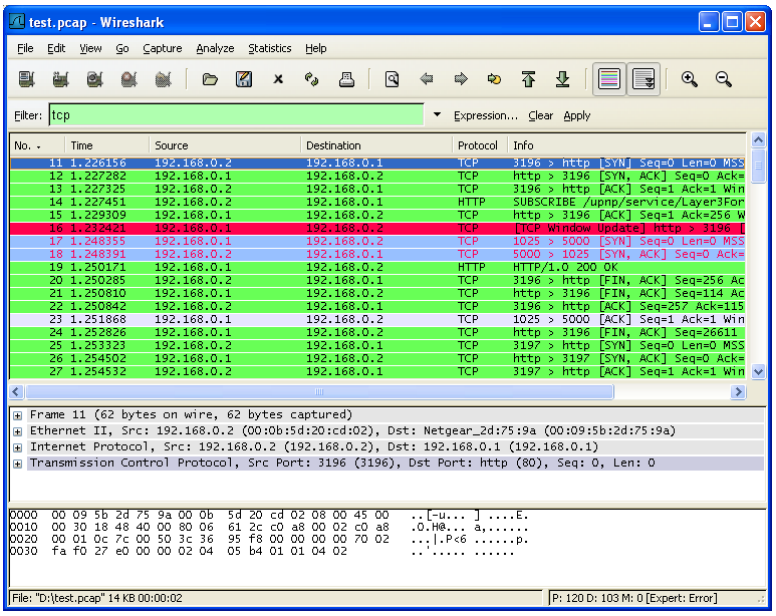

Figure 3.22: Wireshark Troubleshooting

3.4 Some overview of Sonali Bank Limited Network

3.4.1 Sonali Bank Campus Network

Fig: 3.23

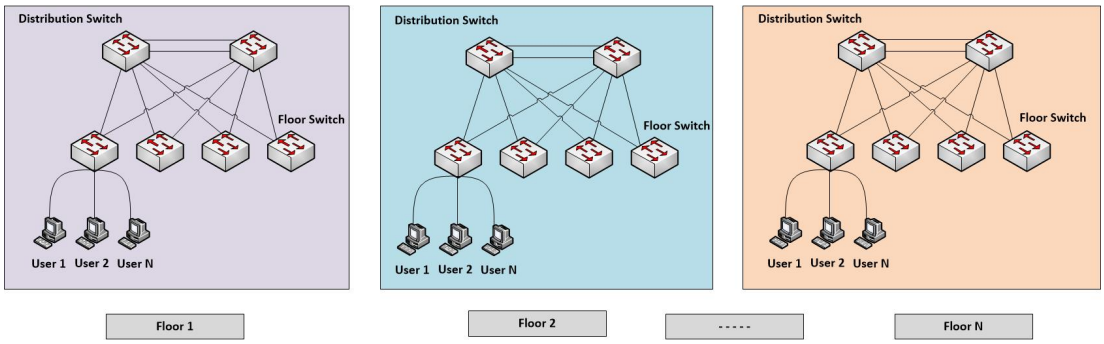

Figure 3.23: Campus Area of SBL

3.4.2 List of Devices used in Sonali Bank Data Center Network Infrastructure

1. Core Router
2. DMZ Router

3. Core Switch
4. Core Firewall (with IPS, AMP, URL Fitting Licence)
5. Serverfarm Switch
6. OMZ Router
7. DMZ Firewall
8. DMZ Switch
9. Bandwidth Manager
10. Load Balancer with DDOs and WAF Security

3.4.3 Sonali Bank overall current Data Center Network Architecture

Fig: 3.24

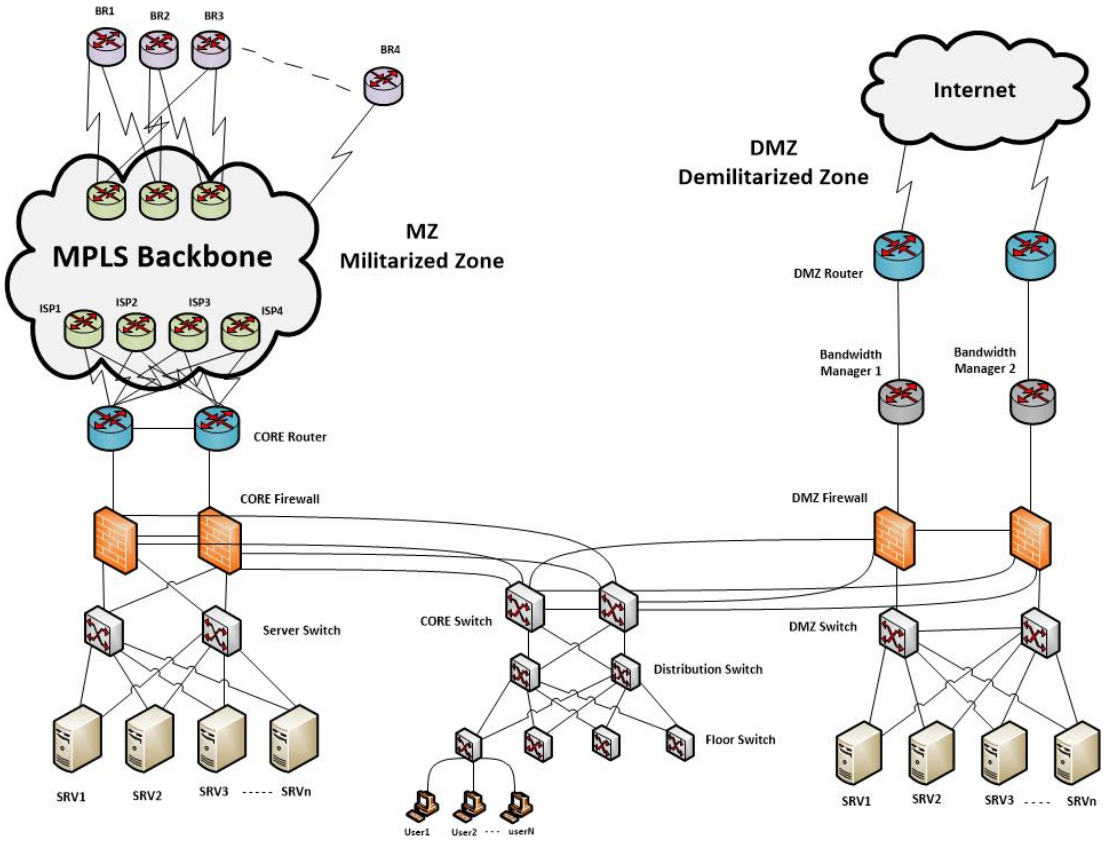

Figure 3.24: Data Center Network Architecture of SBL

Key Results/Key Learning's

Through my internship program, I have learnt a variety of useful skills. I discovered Sonali Bank Limited's banking network infrastructure.

- Market quality-assisted systems administration
- Well-executed apparatuses and careful planning
- Keeping track of various types of work orders based on customer and staff needs and completing them successfully.
- Complete recognition and work on challenging work terminals.

This is a required component of my CSE course. Because of my university, I have my previous work experience prior to starting my full-time career.

- How to apply theoretical learning to technological life
- How to execute work experience in all the things that I studied in university.
- How to interact with people in the business world.

My goal is to become a Network Engineer, and I am sincerely working toward that goal. It is my responsibility to create a remarkable, inventive, and capable organization-based portfolio for the sake of my transporter and my job. My portfolio reflects both my creative efforts and my future success.

Limitations and Recommendations

3.5 Limitations

Preparing a report on practical experience gathered in a short time frame, such as three months, is not a simple assignment. When it comes to a huge area of rules and regulations, especially as a national leading bank and a core network infrastructure. As a result, gathering all required information and understanding core network activities in such a short amount of time is highly challenging. Some issues were observed while creating this report, which are given below:

- As I am beginner, some of the study information is difficult to utilize for me, and there is a shortage of time.
- Because of secrecy, the bank was not permitted to utilize some areas, and access to certain bank divisions was restricted.
- Due to time limits, many of the details could not be included in this report.
- It's also a big working environment constraint in the Covid scenario.

3.6 Recommendations

We might be able to offer some advice to assist them:

- No matter how many employee demand for solving problems, the administration will not suffer as a result of organizational problems.
- Customers and employee will be satisfied, as well as they will adhere to the law when providing a specific level of service.
- The bank's capacity increasing day by day to ensured by affordability.
- The ability to respond customers that receive the best possible service.
- Banks should also be prepared for change, whether it means additional customers or new technologies because of a high-performing network era.
- Banks should keep in mind that digital and physical security are both important. To summarize, high security will be critical for consistency, social responsibility, and responsiveness in order to avoid infamy.

Conclusion

I'll be able to participate in that section-level task, which will be beneficial to my future employment. I'd be prepared to accomplish a lot of things related to device perception, as well as further help in constructing an effective method. I'd want to point out that this entry-level position is beneficial to the leader's noticing framework since it allows me to be productive wherever in the framework region. This temporary job inspires me, gives me energy, and is ideal for my career. I need to figure out how to combine opportunities that have helped me increase my professional knowledge at this bank. This organization provides me with a fantastic opportunity to study and develop my skills. They have my undying gratitude.

3.7 Scope and Future Career

This internship, which will serve as the foundation for my future career, will keep me afloat. Getting a good job at a good company is a difficult task. Finding an outstanding profession is a true challenge.

- As a network monitoring concern, to work for a network organization
- To work on a stage that is based on the Internet Service Provider (ISP).
- Working as a network engineer is something I've always wanted to do.
- To work as a specific assistant as well as the security director.
- Data and Information type job

Glossary

SBL: Sonali Bank Limited

MZ: Militarized Zone

DMZ: Demilitarized Zone

LAN: Local Area Network

WAN: Wide Area Network

OSI: Open Systems Interconnection

IP: Internet Protocol

VLAN: Virtual Local Area Network

ACL: Access Control List

NAT: Network Address Translation

RIP: Routing Information Protocol

OSPF: Open Shortest Path First

BGP: Border Gateway Protocol

EIGRP: Enhanced Interior Gateway Routing Protocol

ISIS: Intermediate System to Intermediate System

IGRP: Interior Gateway Routing Protocol

VPN: Virtual Private Network

GRE : Generic Routing Encapsulation

Bibliography

[1] Sonali bank limited website. [Online]. Available: https://www.sonalibank.com.bd/

[2] "Sonali bank annual report 2020," ttps://www.sonalibank.com.bd/PDF_file/annualreport/2021/Annual_Report_2020.pdf.

[3] O. Sci. Network topology. [Online]. Available: https://www.omnisci.com/technical-glossary/network-topology

[4] GeeksforGeeks. Types of area networks â lan, man and wan. [Online]. Available: https://www.geeksforgeeks.org/types-of-area-networks-lan-man-and-wan/

[5] Forcepoint. What is the osi model? [Online]. Available: https://www.forcepoint.com/cyber-edu/osi-model#:~:text=The%20OSI%20Model%20(Open%20Systems,between%20different%20products%20and%20software.