



# **An Undergraduate Internship/Project on Topic Organization Network: Campus Network at Sonali Bank Limited**

By

**MD Ashikul Islam**

Student ID: 1820160

**Spring, 2022**

Supervisor:

**Romasa Qasim**

**Lecturer**

Department of Computer Science & Engineering

Independent University, Bangladesh

**May 12, 2022**

Dissertation submitted in partial fulfillment for the degree of Bachelor of  
Science in Computer Science

Department of Computer Science & Engineering

Independent University, Bangladesh

# Attestation

This is to authenticate that I, MD Ashikul Islam have completed the report titled "Organization Network: Campus Network" and submitted it in partial fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh. It has been completed under the guidance of my university supervisor Romasa Qasim and company supervisor Mr.Chandan Kumar Poddar who is the senior engineer IT of Sonali Bank Limited. This work has not been submitted as a project to this university previously, neither has it been submitted to any other institution. All the sources of information used in this Project Report has been properly acknowledged in it.

---

Signature

---

Date

MD Ashikul Islam

---

Name

# Acknowledgement

First and foremost, I would like to express my heartfelt appreciation to Almighty Allah, who provided me with the drive and strength to work hard during my internship because of His mercy and grace.

I would like to thank the company's CEO Md. Ataur Rahman Prodhan for giving me the opportunity to work for Sonali bank limited as an Intern and also I want to show my deepest gratitude to Mr Nur sir, my external supervisor at Sonali bank limited who gave me guidance, advice and motivation to work hard; for which I will be forever grateful. My internship at SBL gave me the opportunity to work with the network engineers there who trusted me with them to work in such a big government project and initially guided me towards how the company deals with network construction and the type of engineering knowledge required in this field. The guidance that I received will give me the opportunity to work for this company full time in the future.

Last but not the least, I would like to thank my parents, other family members and friends for their constant support and encouragement.

MD Ashikul Islam

May 2022

Dhaka, Bangladesh

# Letter of Transmittal

May 12, 2022

Romasa Qasim

Lecturer

School of Computer Science and Engineering

Independent University Bangladesh

Subject: Submission of Internship Report

Dear Mam,

It is with a great pleasure that I am presenting the internship report on the project "Organization Network: Campus Network". In Sonali bank limited they are constructing a new campus in Dhaka for their company. I was involved in this project for the completion of my Bachelors Computer Science and Engineering Degree. I am happy to inform you that I have successfully completed my internship for 12 weeks at Sonali bank limited under the supervision of Mr. Chandan Kumar Poddar who is the senior engineer IT of Sonali Bank Limited. This project gave me an opportunity to apply the theoretical knowledge gain at my University

I am hoping that this report will be interesting, unique and informative. I also hope that this meets your expectations. I have tried my best to avoid my mistakes and deficiencies and hope that this report will satisfy you. I would like to end by thanking you again for helping me and giving me the chance to submit this report to you.

Sincerely,

MD Ashikul Islam.

# Evaluation Committee

.....  
Signature

.....  
Name

.....  
Supervisor

.....  
Signature

.....  
Name

.....  
Internal Examiner

.....  
Signature

.....  
Name

.....  
External Examiner

.....  
Signature

.....  
Name

.....  
Convener

# Abstract

Soon after independence of the country Sonali Bank emerged as the largest and leading Nationalized Commercial Bank by proclamation of the Banks' Nationalization Order 1972 (Presidential Order-26) liquidating the then National Bank of Pakistan, Premier Bank and Bank of Bhawalpur. As a fully state owned institution, the bank had been discharging its nation-building responsibilities by undertaking government entrusted different socio-economic schemes as well as money market activities of its own volition, covering all spheres of the economy[1].

The bank has been converted to a Public Limited Company with 100 percent ownership of the government and started functioning as Sonali Bank Limited from November 15, 2007 taking over all assets, liabilities and business of Sonali Bank. After corporatization, the management of the bank has been given required autonomy to make the bank competitive and to run its business effectively.

Sonali Bank Limited is governed by a Board of Directors consisting of 11 (Eleven) members. The Bank is headed by the CEO and Managing Director, who is a well-known Banker and a reputed professional. The corporate head quarter of the bank is located at Motijheel, Dhaka, Bangladesh, the main commercial center of the capital. My project is to create organizational Network : campus network. A computer network

made up of an interconnection of local area networks (LANs) inside a confined geographical region is known as a campus network. Switches, routers, and transmission media such as optical fiber, copper plant, Cat5 cable, and other networking equipment are almost entirely controlled by the campus owner: a corporation, university, government, and so on. In accordance with the project's objectives, have effectively established a sufficient network as well as a viable working environment in SBL office with the support of the entire networking team. Due to advancements in technology infrastructure, the past scarcity of employees in this government sector will be alleviated. With the use of the best fibre connection for internet, office operations such as information and data entry will be more efficient.

**Keywords**— Switch, Router, IP address.

# Contents

<b>Attestation</b>	<b>i</b>
<b>Acknowledgement</b>	<b>ii</b>
<b>Letter of Transmittal</b>	<b>iii</b>
<b>Evaluation Committee</b>	<b>iv</b>
<b>Abstract</b>	<b>v</b>
<b>1 Introduction</b>	<b>1</b>
1.1 Overview/Background of the Work . . . . .	1
1.2 Objectives . . . . .	2
1.3 Scopes . . . . .	2
<b>2 Literature Review</b>	<b>3</b>
2.1 Relationship with Undergraduate Studies . . . . .	3
2.2 Related works . . . . .	4
<b>3 Project Management &amp; Financing</b>	<b>6</b>
3.1 Work Breakdown Structure . . . . .	6
3.2 Process/Activity wise Time Distribution . . . . .	7
3.3 Gantt Chart . . . . .	8
3.4 Process/Activity wise Resource Allocation . . . . .	8
3.5 Estimated Costing . . . . .	9
<b>4 Methodology</b>	<b>11</b>
<b>5 Body of the Project</b>	<b>14</b>
5.1 Work Description . . . . .	14
5.2 Requirement Analysis . . . . .	14
5.2.1 Rich Picture . . . . .	14
5.2.2 Functional and Non-Functional Requirements . . . . .	15

---

5.3	System Analysis . . . . .	17
5.3.1	Six Element Analysis . . . . .	17
5.3.2	Feasibility Analysis . . . . .	18
5.3.3	Problem Solution Analysis . . . . .	19
5.3.4	Effect and Constraints Analysis . . . . .	20
5.4	System Design . . . . .	21
5.4.1	Network Topology . . . . .	21
5.5	Implementation . . . . .	22
5.6	Testing . . . . .	23
5.6.1	Input . . . . .	23
5.6.2	Output . . . . .	24
5.6.3	Test Results . . . . .	24
<b>6</b>	<b>Results &amp; Analysis</b>	<b>25</b>
<b>7</b>	<b>Project as Engineering Problem Analysis</b>	<b>26</b>
7.1	Sustainability of the Project/Work . . . . .	26
7.2	Social and Environmental Effects and Analysis . . . . .	27
7.3	Addressing Ethics and Ethical Issues . . . . .	27
<b>8</b>	<b>Lesson Learned</b>	<b>29</b>
8.1	Problems Faced During this Period . . . . .	29
8.2	Solution of those Problems . . . . .	30
<b>9</b>	<b>Future Work &amp; Conclusion</b>	<b>31</b>
9.1	Future Works . . . . .	31
9.2	Conclusion . . . . .	32
	<b>Bibliography</b>	<b>34</b>



# List of Figures

3.1	Work Breakdown Structure . . . . .	6
3.2	Process/Activity wise Time Distribution for campus network . . . . .	7
3.3	Gantt Chart for campus network Project . . . . .	8
3.4	Process/Activity wise Resource Allocation for Campus Network . . . . .	9
3.5	Costing of the project . . . . .	10
4.1	PPDIOO cycle . . . . .	12
5.1	Rich Picture . . . . .	15
5.2	Six Element Analysis . . . . .	17
5.3	Six Element Analysis . . . . .	18
5.4	Network Topology . . . . .	21
5.5	campus network . . . . .	22
5.6	Input . . . . .	23
5.7	Output . . . . .	24

# List of Tables

# Chapter 1

## Introduction

### 1.1 Overview/Background of the Work

I started my internship program at Sonali Bank Limited in IT department networking section from 4Th January,2021. Sonali Bank Limited is Bangladesh's main state-owned major public commercial bank. It is the country's largest bank.

Network is a group of two or more computers other electronic devices that are interconnected for the purpose of exchanging data and sharing resources. Employees can share ideas and operate more efficiently with the use of computer networking.It increases employees productivity while also increasing the company's revenue. More crucially, computer networking enhances the way businesses provide services to the rest of the globe.

In this program, Mr.Chandan Kumar Poddar is my supervisor. He is the senior engineer IT of Sonali Bank Limited. He helps me to understand my different work and assigns me work daily. I am getting a whole overview how to handle a project professionally. In that mean time, I will be also learning Router configuration, switch configuration, LAN, WAN,Rj45 color coding ,cabling ,maintenance and reporting etc.

My project is to create organizational Network : campus network. A computer network made up of an interconnection of local area networks (LANs) inside a confined geographical region is known as a campus network, campus area network, corporate area network, or CAN. Switches, routers, and transmission media such as optical fiber, copper plant, Cat5 cable, and other networking equipment are almost entirely controlled by the campus tenant / owner: a corporation, university, government, and so on. A campus area network is bigger than a local area network, but it's not as big as a metropolitan area network (MAN) or a wide area network (WAN).

## 1.2 Objectives

- **Setup a stable network-** Our engineers will use their knowledge and skills to set up a reliable network connection for Sonali Bank campus that will be ideal for simplicity of use and will not cause any connectivity issues.
- **Provide the required bandwidth-** Every department of the campus of sonali bank will be provided with the desired Network bandwidth speed so that employees can work and share data without any delay.
- **Provide high-quality networking hardware-** The hardware necessary for the Campus network can be purchased from a variety of hardware manufacturers. We'll be using the most reliable hardware, starting with fiber optics that can transfer up to 100 GB of data, Cisco switches and routers, and Dell desktops.
- **Set up the most appropriate LAN connection-** Work compatibility is critical in an office setting, and having a well-organized setup is essential for productivity. For maintaining the flow of work properly will set up suitable LAN connection.

## 1.3 Scopes

The possibilities after the complete construction of organizational network: Campus Area network are given below:

- Stable network.
- Faster connectivity
- Improved work efficiency
- More data reliability

# Chapter 2

## Literature Review

### 2.1 Relationship with Undergraduate Studies

I was able to engage in and work on this project at Sonali Bank Limited with the knowledge and abilities that I received and studied in several classes here at Independent University, Bangladesh (IUB). While taking these classes, I had to acquire a few more things in order to align my knowledge with the company's requirements. The following are some of the courses that were beneficial to me:

- **CSE316: Data Communication and Computer Networks**-This lesson in this course was directly relevant to my field of work. The OSI reference model and how network communication works across the seven tiers were taught to me in this course. Network categories and topologies, the TCP/IP protocol suite, TCP/IP applications, FTP, transport layer protocols, link layer protocols, internetworking devices, routing algorithms, IP addressing, subnetting, network programming, and LAN types and technology were among the other subjects covered. The skills learned in this course were essential in the creation of an organizational network: the campus network.
- **CSE 400: Data Communication**- The concepts and tools for managing telecommunication systems and computer networks were introduced in this course. I learned about the basic models that are utilized in the Internet and telecommunication networks.
- **CSE406 Cryptography and Network Securities**- Although I didn't need much information from this course for my project at Sonali Bank, it did introduce the principles and practice of cryptography and its use in network security, as well as understand a variety of generic security threats and vulnerabilities and identify and analyze specific security problems for a given application.

## 2.2 Related works

Administrative buildings, academic buildings, university libraries, campus or student centers, residence halls, gymnasiums, and other outlying structures, such as conference centers, technology centers, and training institutes, are frequently interconnected by college or university campus area networks. The Stanford University Network at Stanford University, Project Athena at MIT, and the Andrew Project at Carnegie Mellon University are among early examples.

The Stanford University Network (SUNet) consists of local networks within buildings and a backbone network that connects the local networks to each other and to networks off campus. The backbone is designed and operated by University IT. Network services within individual buildings are the responsibility of the departments that occupy those buildings, unless support is purchased from University IT. For academic and administrative buildings, we provide and support the data communication infrastructure to the facility entrance. Through the Net-to-Switch program, we provide data communication infrastructure within the academic and administrative buildings. For student residences, we support the data communication infrastructure to the service outlets in student rooms. Off-campus connectivity is maintained through multiple internet connections as well as Internet2. For student residences, University IT supports the data communication infrastructure to the telecommunications service outlet (i.e., the wall jack) in student rooms. The Student Technology group within the VPSA Learning Technologies Spaces department supports students in their use of network services in student housing facilities. When necessary, Student Technology consults and enlists support from University IT.[2]

Project Athena's mandate was to explore diverse uses of computing and to build the base of knowledge needed for a longer term strategic decision about how computers fit into the MIT curriculum. In January of 1988, Project Athena was granted a three-year extension to the original five-year program, and on June 30, 1991, Project Athena came to an end. But the fruit of Project Athena – the Athena system itself – was adopted as MIT's academic computing infrastructure, with plans to extend it beyond the educational sphere, into the research and administrative activities of the Institute. What, then, is Athena? It is a campus-wide networked computer system serving the needs of MIT's academic community. Rather than having a single computing center, Athena has over 600 end-user workstations distributed around campus in both general-use and departmental "clusters" where students and faculty can go 24 hours a day, 365 days a year to do classwork, write papers, do personal work, and communicate with other computer users worldwide. The Athena system is actually composed of a large number of machines (workstations, printers, and servers) that are net-worked

together, and is far more powerful than other computing facilities you have probably used. Athena provides a bridge between the two familiar extremes of stand-alone personal computers and timesharing machines. Each user of an Athena workstation has a dedicated, powerful multi-tasking computer at his or her disposal. And each Athena workstation is connected to MITnet, the campus-wide computer network, so you can access a number of shared services that would normally be available only on a central facility.[3]

# Chapter 3

## Project Management & Financing

### 3.1 Work Breakdown Structure

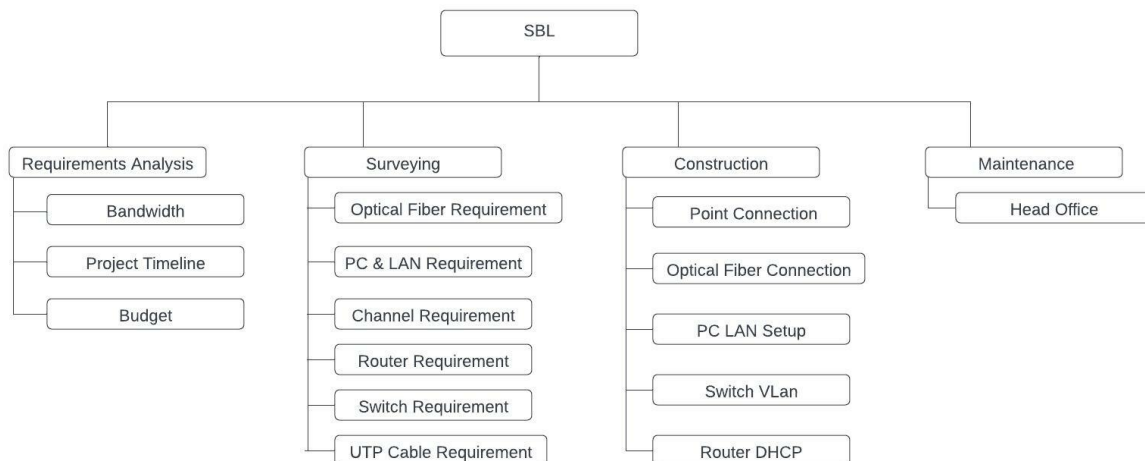


Figure 3.1: Work Breakdown Structure

Work Breakdown Structure (WBS) is a productivity technique that divides work into smaller tasks in order to make it more manageable and approachable. One of the most significant project management documents is this technique.

The above diagram shows us the work breakdown structure (WBS) of Organizational network: campus Network Construction. Here, we can see four main project phases which are required to complete the project. Those five phases are:

1. The phase of requirement analysis is when the organization learns about the project's precise requirements from the client. This phase consists of three sub-tasks: confirming the amount of internet bandwidth required in the campus office, project deadlines, and, most significantly, the project budget.



2. Surveying is the very first phase of the project's network construction, and it consists of six subtasks: calculating the length of optical fiber required, the number of PCs required for the office and the LAN setup structure, the channels required, the router and switch requirements, and finally the number of UTP cables required in the campus office.

3. The network construction procedure is divided into five sub-tasks. The first duty is to find an existing place in the office from which the optical fiber will connect to the router, and the second task is to connect the optical fiber to the router. The final task entails connecting the computers to a LAN that will be connected to a Cisco switch. The fourth task will be to configure the Cisco switch for Vlan configuration in the office, and the final task will be to configure the routers for the PCs to receive IP via DHCP.

4. The final phase, maintenance, includes only one sub-task: ensuring that the network's physical upkeep is carried out.

The WBS has provided us with a clear roadmap for tackling these responsibilities one by one. The project appeared to be more manageable and less sophisticated as a result of this.

## 3.2 Process/Activity wise Time Distribution

Tasks	Days
Requirement Analysis	10
Surveying	30
Construction	70
Maintenance	10
<b>Total</b>	<b>120</b>

Figure 3.2: Process/Activity wise Time Distribution for campus network

The Time Distribution by Process/Activity offers us a table with the set of tasks that

must be accomplished together with the time required to finish each task. According to the table, requirement analysis will take approximately 10 days, surveying will take approximately 30 days, network construction will take approximately 70 days, and the maintenance office will require around 10 days. In total, the project is expected to take roughly 120 days to complete, implying that it will take more than 3 months to finish.

### 3.3 Gantt Chart



Figure 3.3: Gantt Chart for campus network Project

The Gantt Chart of the Campus Network Project is shown in the diagram above. A Gantt Chart is a visual representation of a project's progress. We can see from the chart above how each task, along with its sub-tasks, took a set amount of time to accomplish and how those tasks were divided according to that allocated time to be done in that precise timespan.

### 3.4 Process/Activity wise Resource Allocation

The Resource Distribution by Process/Activity offers us a table with the set of tasks that must be accomplished together with the quantity of effort required to finish each task. The following are the top five tasks:

- 1.Requirement Analysis:** The first and most crucial task is to fully comprehend the client's objectives, as well as to reach a viable financial agreement that allows the project to move forward.
- 2. Surveying:** Before beginning the building of the campus network. Hardware setup in the campus office, all of the floors in the office were surveyed. During the survey, the equipment needed for the campus office was highlighted.
- 3. Construction:** The majority of the work was spent establishing the network, as the office required new desktop configurations with LAN connections, as well as

Tasks	Work percentage
Requirement Analysis	10%
Surveying	25%
Construction	50%
Maintenance <input type="checkbox"/>	15%
<b>Total</b>	<b>100%</b>

Figure 3.4: Process/Activity wise Resource Allocation for Campus Network

configuration of all routers that had to deliver IP to the PCs via dhcp. The switches were configured with Vlan, as was the desktop setup, which required a Vlan connection.

4. **Maintenance:** The maintenance of the total Network will be maintained from the campus office.

## 3.5 Estimated Costing

The equipment necessary for the complete network construction for Organizational network: Campus Network is listed in the table above. Campus Network is upgrading its office and will be hiring new staff, so desktop installation in the office was a basic prerequisite for work, and roughly 4800 Dell PCs were ordered. Cisco's RV160W router was required, and the office required a non-manageable switch with Vlan connections, which were provided by Cisco switches, models SF95-24-AS 24-Port SMB and SG350-28 28-Port. The typical LAN configuration consisted of 8-10 desktops connected by UTP cables that were channeled around the office.

Equipment	Unit	Per Unit Cost/Taka	Total Unit Cost/Taka
Desktop	480	45000	21,600,000
Cisco Router	1	400000	400000
Cisco Switch	7	9000	54000
Optical Fiber Cable	25000 meters	14	350,000
UTP Cable	700 meters	30	21,000
Printer	250	7000	1,750,000
UPS	480	3500	1,680,000
Fiber Media Converter	40	1000	40,000
Fiber joint Box	60	100	6,000
Summit Bandwidth	4000mbps	450	1,800,000
<b>Total</b>			<b>27,680,000</b>

Figure 3.5: Costing of the project

# Chapter 4

## Methodology

The Cisco PPDIOO methodology [4], which reflects a network's life-cycle, inspired the network design methodology we employed in this project. The creation of a network is divided into six phases, and this life-cycle strategy offers various advantages. Among the advantages are

- Increasing network availability
- Lowering the total cost of network ownership
- Speeding access to applications and services
- Improving business agility

In today's corporate climate, the total cost of network ownership is very crucial. Enterprise leaders are looking for ways to decrease costs related with IT. Network availability has always been a major goal for any business since as the number of users using services grows, so do earnings. However, network outages can result in income loss. A productive environment requires easy access to network applications and services. As a result, access to network applications and services is accelerated by the network life-cycle.

The six phases of this methodology are:

- Prepare
- plan
- Design
- Implement
- Operate
- Optimize



Figure 4.1: PPDIOO cycle

- **Prepare:** Involves establishing the organizational requirements, developing a network strategy, and proposing a high-level conceptual architecture identifying technologies that can best support the architecture. The prepare phase can establish a financial justification for network strategy by assessing the business case for the proposed architecture.
- **Plan:** Involves identifying initial network requirements based on goals, facilities, user needs, and so on. The plan phase involves characterizing sites and assessing any existing networks and performing a gap analysis to determine whether the existing system infrastructure, sites, and the operational environment can support the proposed system. A project plan is useful for helping manage the tasks, responsibilities, critical milestones, and resources required to implement changes to the network. The project plan should align with the scope, cost, and resource parameters established in the original business requirements
- **Design:** The initial requirements that were derived in the planning phase drive the activities of the network design specialists. The network design specification is a comprehensive detailed design that meets current business and technical requirements, and incorporates specifications to support availability, reliability, security, scalability, and performance. The design specification is the basis for the implementation activities.
- **Implement:** The network is built or additional components are incorporated according to the design specifications, with the goal of integrating devices without disrupting the existing network or creating points of vulnerability.
- **Operate:** Operation is the final test of the appropriateness of the design. The operational phase involves maintaining network health through day-to-day operations, including maintaining high availability and reducing expenses. The fault detection, correction, and performance monitoring that occur in daily operations provide the initial data for the optimization phase.
- **Optimize:** Involves proactive management of the network. The goal of proactive management is to identify and resolve issues before they affect the organization. Reactive fault detection and correction (troubleshooting) is needed when proactive management cannot predict and mitigate failures. In the PPDIOO process, the optimization phase can prompt a network redesign if too many network problems and errors arise, if performance does not meet expectations, or if new applications are identified to support organizational and technical requirements.

# Chapter 5

## Body of the Project

### 5.1 Work Description

Sonali Bank Limited (SBL) is the principal state-owned leading public commercial bank in Bangladesh. It is the largest bank of the country. 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.[5]

My project is to create organizational Network : campus network for sonali bank limited new campus building in dhaka. A computer network made up of an interconnection of local area networks (LANs) inside a confined geographical region is known as a campus network, campus area network, corporate area network, or CAN. Switches, routers, and transmission media such as optical fiber, copper plant, Cat5 cable, and other networking equipment are almost entirely controlled by the campus tenant / owner: a corporation, university, government, and so on. A campus area network is bigger than a local area network, but it's not as big as a metropolitan area network (MAN) or a wide area network (WAN). My project responsibility was to construct a strong and reliable network for them.

### 5.2 Requirement Analysis

#### 5.2.1 Rich Picture

A rich picture is a form of diagram used in the early phases of a project. This allows us to see what would happen in the system . This allows the team to come up with a



shared vision for how the system should be created. The rich picture of SBL campus network is given below:

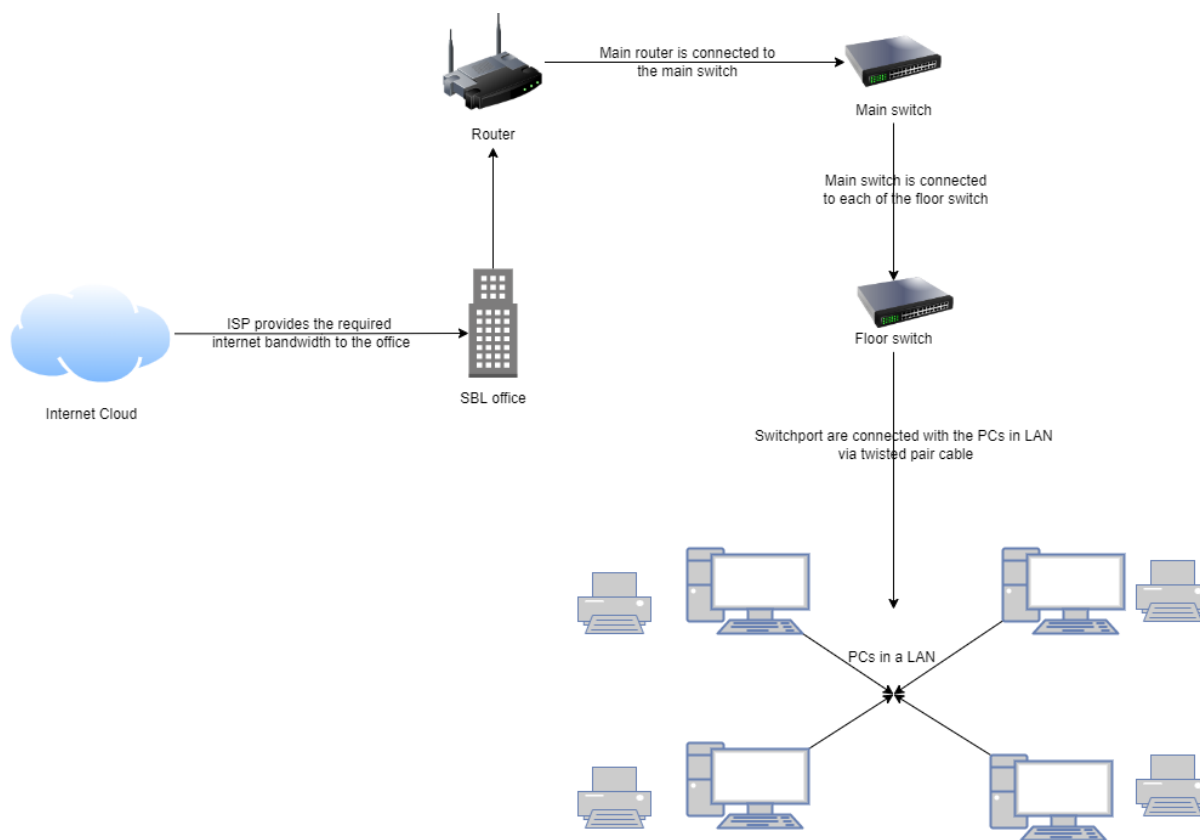


Figure 5.1: Rich Picture

### 5.2.2 Functional and Non-Functional Requirements

The functionality that the system must have in order to be viable is referred to as a functional requirement[6]. Functional Requirements are useful in the development of a system. It informs us about the functionality that we should expect from the system; faults can be detected at this stage, which is less expensive to rectify; and it assists us in determining whether any functionality is missing.

The functional requirements which the project tried to meet are:

- **General Functional Requirements:** The general functional requirements included efficient data communication via fibre connectivity, LAN connectivity on PCs, and VLAN configuration on switches is required in office.
- **Physical Layer Characteristics:** Data transmission from beginning to finish via the physical medium of fiber optic cables.

- Media Access Control Characteristics: The data link layer accurately recognizes the MAC addresses of the end devices and successfully transmits packets for decryption.
- Logical Link Control Characteristics: Synchronization, flow control, and error checking should all be flawless during data transfer to ensure that no packets are dropped.
- Errors, Failures and Maintenance: Troubleshooting will be conducted at both the user and provider end to reset the network in the event of a disconnection or failure of data connectivity, and the head office will provide a backup link at this time.

A non-functional requirement [7] is a specification that outlines the system's operation capabilities as well as the limitations that help it perform better. The non-functional requirements that I will be discussing for the project are given below:

- Availability: The amount of uptime in a network system over a given time frame is referred to as network availability. The length of time a network is fully operating is referred to as uptime. Because SBL's office work involves data entry, network connectivity during business hours is critical, and this will be ensured at all times by our SBL headquarters.
- Reliability: Our fibers are of excellent quality, with a 4-core arrangement for smooth data transfer, and our bandwidth speed is dependable. A reliable protocol is a communication protocol that alerts the sender whether or not data delivery to intended recipients was successful.
- Recoverability: The process of recovering and restoring normal working functions on a computer network is known as network recovery. It allows network administrators to re-establish and restore network activities when the network has gone offline, been disconnected, crashed, or other events have disrupted normal network operations.
- Serviceability: Our SBL's network will be maintained at all times by our SBL's headoffice, so that any loss of connectivity can be regained at any time of the day.

## 5.3 System Analysis

### 5.3.1 Six Element Analysis

Process	System Roles					
	Human	Non-Computing Hardware	Computing Hardware	Software/System	Database	Network & Communication
Requirement Analysis	<b>1. Business analysts</b> Understands requirements of the client and negotiates the budget allocation for the project.	<b>1. Pen &amp; Paper</b> Stationaries and paper were need by the analysts for taking notes about the requirements.	<b>1. Tablet</b> A softcopy of information is kept for the preparation of a quotation.  <b>2. Printer</b> A hardcopy of the quotation is printed.	<b>1. MS Word</b> This Microsoft office application is used to prepare the quotation of the project.	None	<b>1. Internet</b> A Wi-Fi connected printed uses internet to receive printing information from the tablet.
Surveying	<b>1. Junior Network Engineers.</b> Surveying the offices are performed by the engineers who gather information about the equipment required for the network construction.  <b>2. Interns</b> Ux interns are also involved in assisting the surveying process.	<b>1. Pen &amp; Paper</b> Stationaries and paper were need by the analysts for taking notes on the list of equipment needed.	<b>1. Laptop</b> A softcopy of information about the amount of equipment needed are made into an excel sheet.  <b>2. Printer</b> A hardcopy of the excel sheet is printed.	<b>1. MS Excel</b> This Microsoft office application is used to prepare the list of required equipment.	None	<b>1. Internet</b> A Wi-Fi connected printed uses internet to receive printing information from the Laptop.

Figure 5.2: Six Element Analysis

<b>Network Construction</b>	<p><b>1. Electrician</b> The wiring management of the fibre cables and the LAN cables are done by the electricians.</p> <p><b>2. Computer Engineers.</b> The desktop setup in the offices are managed by computer engineers.</p> <p><b>3. Interns</b> Assistance for the computer engineers.</p>	<p><b>1. Fibre Cable</b> For the Internet connectivity fibre cables are used to connect the offices with the points.</p> <p><b>2. UTP Cable</b> The desktops in the offices are connected in a LAN setup using the UTP cables.</p> <p><b>3. Channels</b> The UTP cables are covered using Channels.</p>	<p><b>1. Desktops</b> 4-8 PC's will be in a LAN connection for the officers use.</p> <p><b>2. UPS</b> In case of load shedding, the UPSs will power the desktops with a back time of about 1h.</p>	<p><b>1. Windows</b> The operating system for all the desktops will be windows 10 which will be a more efficient OS compared to the one being used before.</p>	None	None
<b>Routing and Switching configuration</b>	<p><b>1. Senior Network Engineers.</b> The main routing configuration of network will be managed by the engineers from the system department</p> <p><b>2. Junior Network Engineers.</b> The switching configuration and VLAN.</p> <p><b>3. Interns</b> DHCP configuration and assistance.</p>	None	<p><b>1. Router</b> For IP address allocation and bandwidth distribution Cisco routers were configured.</p> <p><b>2. Switch</b> For the PCs to have VLAN configuration manageable switches were used.</p> <p><b>3. Laptop</b> The configurations of the routers and the switches were done via laptops.</p>	None	None	<p><b>1. Internet</b> A broad band connection was used for the laptops while router and switch configuring.</p>

Figure 5.3: Six Element Analysis

### 5.3.2 Feasibility Analysis

A feasibility study is a study that helps us understand specific aspects of a project and how those aspects might aid in the project's development. Analyzing the feasibility criteria would make it easier to determine the difficulties that may arise during the project. The feasibility factors[8] that we analyzed for the network construction for organizational network: Campus network are given below:

- **Operational Feasibility:** The project would be considered successful in the Operational Feasibility sector only if all of the project's requirements are met, and the project's operation is successful and maintained once the network is completed. The project has been successful because the design of the project and the construction is successful and the fast internet connectivity was set which made the work more efficient.
- **Technical Feasibility:** The resources available, including hardware and software, as well as the other essential technology, are assessed for the technical feasibility to understand the project's development. This is accomplished by focusing on the technological viability. The capability of managing these technical devices is analyzed in this way to see if it will be efficient and successful in the network construction process. The most significant networking hardware in our project was routers, switches, UTP, and Fibre cable, and the quality of these goods will decide the strength and security of SBL's campus network. The majority of our hardware in this project was of high quality, particularly the 4-core optic fibres used for communication and Cisco routers and switches. So, it can be said that this project is Technically feasible.
- **Economic Feasibility:** The project's cost and benefit are examined in this analysis. This sector oversees of the costs associated with the surveying, construction, and configuration processes. The studied data determines whether or not the project will be successful in terms of the economic sector. Because this was such a large project, the budget negotiations with SBL were handled meticulously while keeping the company's profit margins in mind, ensuring the project's economically feasible.
- **Scheduling Feasibility:** The timing of the project was examined in this research to ensure that it would be completed on time. If the project's deadline is met, the project will be a success. The project's proposed completion timetable was four months, and our business completed their network well ahead of schedule.

### 5.3.3 Problem Solution Analysis

This section discusses the problems that were recognized, examined, and eventually a solution devised to solve those problems. The following are the issues that have been identified:

- **Poor Internet Connectivity-** Strong internet connection is a must for offices for completing the work efficiently. so we have to ensure that the required internet speeds need to be provided.

- Setup stable network- setting up a stable network is necessary for the office to continue work smoothly.
- improve security - Its more important to have strong securities system in the bank.
- Poor power backup- As Bangladesh face power cut and load shedding problems which may cause disruption in working hours.

The solutions to the problems that have been identified are given below:

- Solution for poor Internet Connectivity- The office's fibre connection, which has a 100 mbps internet bandwidth, will provide users with a significantly smoother and faster working experience. The high-quality 4-core fibres utilized in the network's construction will also help to ensure a consistent and dependable speed.
- Solutions for set up stable connection - For a better experience, new desktop configurations with the latest software system have been delivered in the office with a LAN connection.
- Solution for improve security - For improving security advance firewall was used and also adding the latest security software in the system.
- Solution for Poor power backup- All the desktops will have back-up power up to 1 hour from the 1 kva online UPS.

#### 5.3.4 Effect and Constraints Analysis

Our network construction project for SBL will vastly increase the quality of work performed by these offices. The technical solutions we provided will provide banking flexibility with job prospects. Sonali Bank Limited is the principal state-owned leading public commercial bank in Bangladesh. It is the largest bank of the country. The bank has been converted to a Public Limited Company with 100 percent ownership of the government and started functioning as Sonali Bank Limited from November 15, 2007 taking over all assets, liabilities and business of Sonali Bank.[9]The government office's technology standards will improve after the network is implemented. Using a fiber connection for internet connections will be a huge plus factor in terms of communication and job effectiveness.

## 5.4 System Design

### 5.4.1 Network Topology

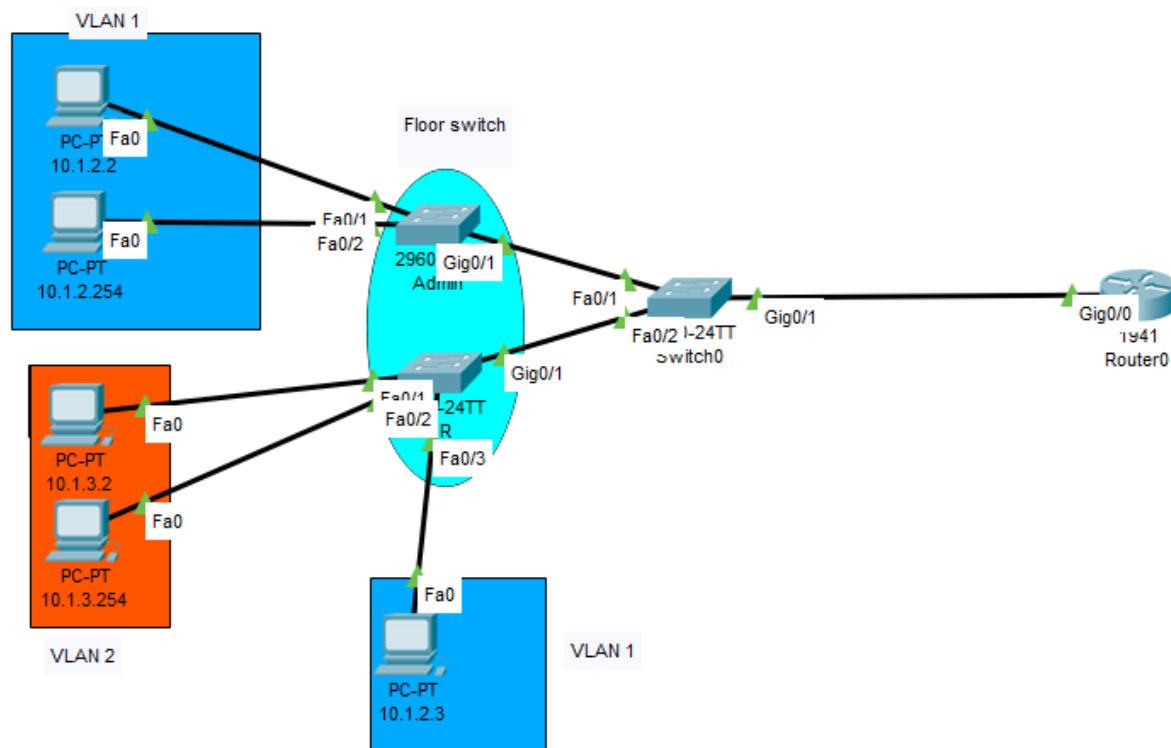


Figure 5.4: Network Topology

Most of the departments in SBL's workplace are made up of 8-10 desktops connected through a LAN and will follow the structure shown in Figure 5.4. Vlan is setup in this topology, which consists of a switch. The PCs will get their IP from the router using DHCP, which will be configured in the routers together with NAT to allow other devices to connect to the internet.

## 5.5 Implementation

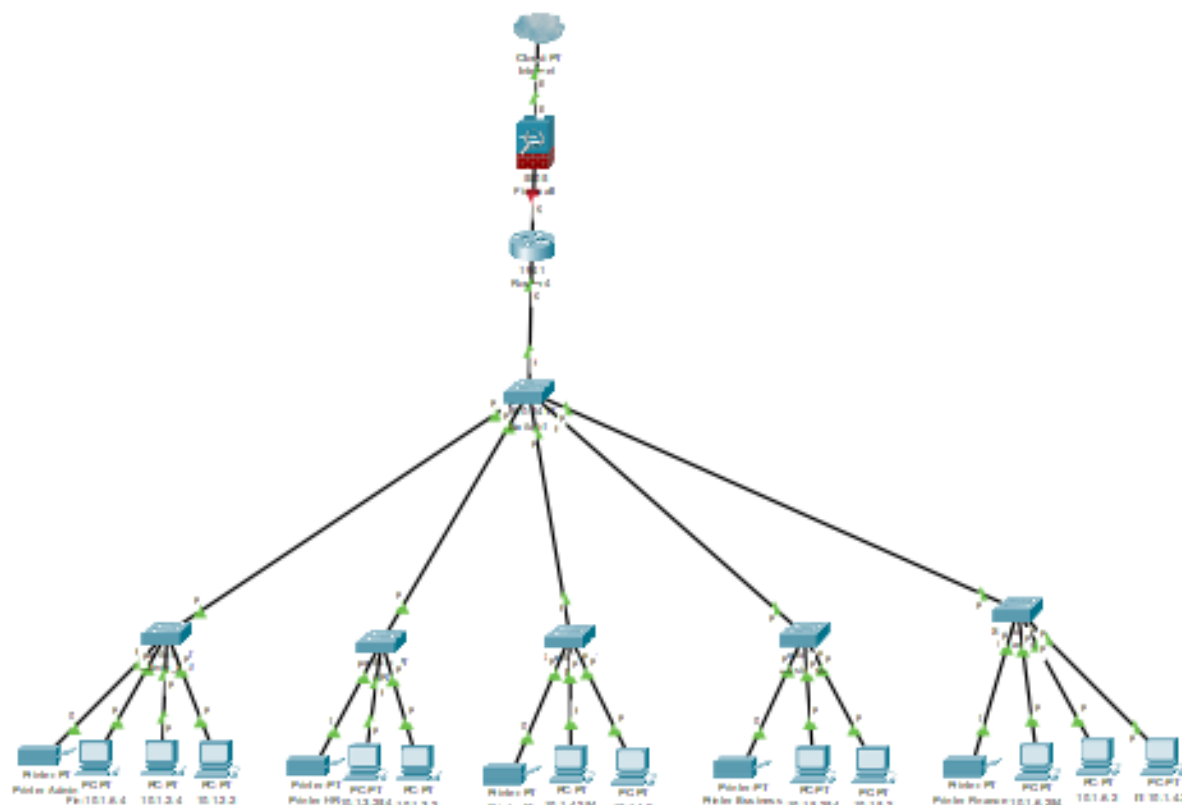


Figure 5.5: campus network

This is the complete design of the organization Network: Campus network. Internet is provided by the ISP provider in the campus. In this design, there is one main router for the whole campus. And there is also one main switch in the campus network which is connected to all the floor switches. In each floor switch, it is connected to the PCs and printers of the office. Every switch in the network has been done with VLAN configuration. Inter-VLAN routing is also done in the network for smooth communication in the network. Each Department of the campus is given a specific VLAN so that data traffic flow can happen without any delay and the router is configured with DHCP so that every computer in the network can get a dynamic IP from the router, also there is NAT for using the web services in the network. Firewall is also connected to the network for restricting unwanted and harmful data and securing the whole network.



## 5.6 Testing

### 5.6.1 Input

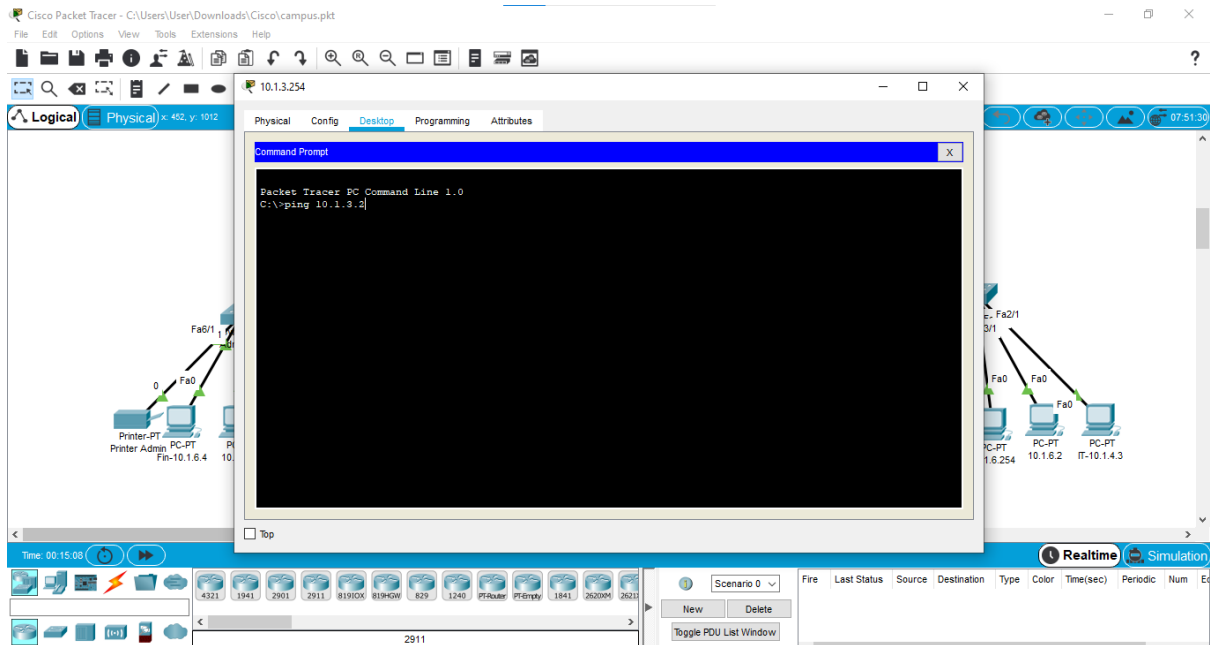


Figure 5.6: Input

Here we are pinging one pc in the network to the another pc in the network to check the connectivity and the successful configuration in the network system.

## 5.6.2 Output

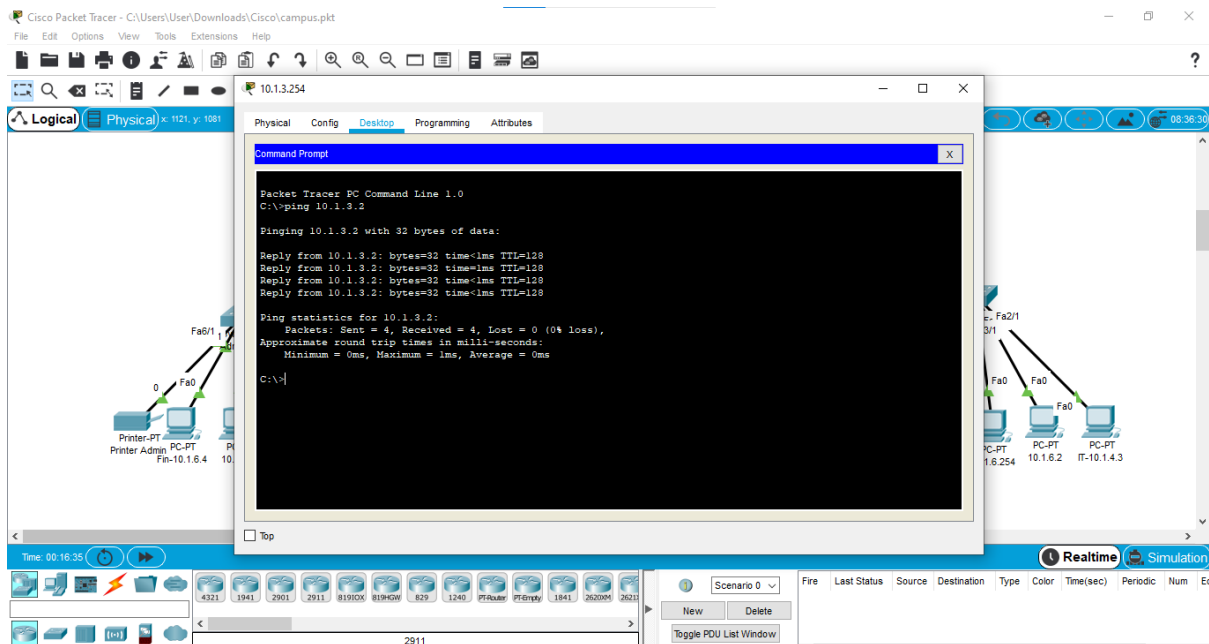


Figure 5.7: Output

## 5.6.3 Test Results

we can see that the network connectivity is smooth because in the figure 5.7 we can see the pinging in the two PCs was successful in the network. Which confirm that the configuration and the connectivity in the network was successful.

# Chapter 6

## Results & Analysis

The SBL network construction project, which was performed by the company's network department, Services has significantly improved the company's technological infrastructure. In this section, I'll discuss the outcomes and impact of our initiative on SBL's new campus.

This was a networking project with the added responsibility of managing technical equipment supplies in order to boost the technological capabilities of the government bank offices. In accordance with the project's objectives, have effectively established a sufficient network as well as a viable working environment in SBL office with the support of the entire networking team. Due to advancements in technology infrastructure, the past scarcity of employees in this government sector will be alleviated. With the use of the best fibre connection for internet, office operations such as information and data entry will be more efficient. Internal communication among SBL officers will be far more straightforward and cost-effective.

Sonali Bank Limited will see a significant improvement in data collecting and reporting in the near future. As a top bank in the country, a reliable network connection is essential, as it will benefit Bangladesh's enormous population.

# Chapter 7

## Project as Engineering Problem Analysis

### 7.1 Sustainability of the Project/Work

When it comes to the product/long-term work's viability, a number of factors come into play. The ability of a product to be maintained and upgraded is referred to as its sustainability. It is critical to comprehend the ideas of sustainability and develop a suitable sustainability plan in order to avoid project failure.

The sustainability of the product can be categorized into 3 parts[10]:

**a. Community Sustainability:** The term "community sustainability" relates to how much the community, or the officers who will use the network, will support the project's long-term viability. Our service will be sustained if we can work efficiently with the availability of our network services and appropriately utilize technological infrastructure.

**b. Financial Sustainability:** Our company's pricing for building the network not only covers all of the costs associated with maintaining the service, but it also generates a profit. This will ensure that the company's financial stability is maintained and that profits are generated in the future.

**c. Organizational Sustainability:** Our company is always investing in developing our services with the support of our employees who are continually trying to improve their networking knowledge and skills, which will aid us in strategically tackling unique obstacles in this market and allowing us to compete with other businesses.

## 7.2 Social and Environmental Effects and Analysis

In our daily lives, networking is essential. Without network connections, most businesses, corporate offices, banks, schools, and increasingly even most homes are non-functional. Because networks are the cornerstone of technology use, any project undertaken by our organization has social and environmental implications. Our networking project for SBL was a significant improvement to their technology infrastructure, which will benefit not only the staff but also the general public of our country, as SBL is the largest bank in the country.

**a. Social Effect:** Our project will have a good social impact on SBL employees. Work will be easier and more efficient on a daily basis. Our system allows for seamless communication across offices in different regions, which improves the ease with which information may be shared. More importantly, improved data sharing accuracy will benefit consumers who are reliant on the bank.

**b. Environmental Effect:** Networking initiatives have a harmful impact on the environment. The amount of overhead fiber cables employed in this project is around 20 kilometers long, causing visual pollution. Because Bangladesh lacks a system for laying underground optic fibre cables, electric polls are utilized instead, and fires caused by electric polls are a common hazard, producing air pollution.

## 7.3 Addressing Ethics and Ethical Issues

All phases of the networking process must adhere to business networking ethics[11]. It should be practiced in all types of networking, including utilitarian, emotional, and virtuous networking.

**1. Utilitarian Networking:** Ethical utilitarian networking ensures that your networking does not waste the time of your clients by being well-planned, strategic, and valuable. The company was able to provide the promised networking equipment and is now providing the office with the real bandwidth requirements.

**2. Emotional Networking:** Ethical emotional networking enables people to recognize why they need to be ethical in a scenario rather than simply following a regulation. Our clients will be unable to make ethical decisions if they do not completely comprehend the concerns, so it is our obligation to explain the repercussions so that the other party understands what will happen if an unethical option is taken.

**3. Virtuous Networking:** Acting in good faith, having honest intentions, and

participating in authorized activities are all characteristics of virtuous networking. It also entails reciprocal exchange of information, knowledge, and resources, as well as a good ethical influence inside the network.

# Chapter 8

## Lesson Learned

### 8.1 Problems Faced During this Period

In this section, I'll talk about the obstacles I had throughout my three-month internship at Sonali Bank Limited. It was my first experience to a business environment, and I was given the opportunity to learn while working on a networking project which our company was constructing for their new campus. I have also learned a lot in both the networking and corporate worlds.

**Adjusting to Corporate Culture:** In each corporate office environment, the culture is not defined; rather, it must be learned and adapted to the employees' cumulative behavior. It was challenging for me to adjust to the company's learning and working phases after being exposed to such an environment. My internship's learning phase was not solely focused on networking and data communication; it also included self-education in dealing with various types of individuals from various departments.

**Requirement Analysis of Equipment:** During the project talks, the installation of technological equipment in the office was a general necessity. Complete desktop sets were to be built in addition to our networking devices, and as with these types of projects that involve a large quantity of equipment, it is best to be certain of the office's requirements in advance. It is not an easy task to write a report based on actual experience gained in a short period of time, such as three months. When it comes to a vast area of rules and regulations, especially as a national leading bank and a key network infrastructure, there is a lot to consider. As a result, acquiring all necessary data and comprehending key network activity in such a short period of time is quite difficult.

**Routing Configuration:** The system configuration is the most important engineering in a networking project since it ensures that data transfer is successful from beginning

to end. SBL uses Cisco routers for network routing, which was formerly the responsibility of the system department. However, because the SBL project was administered by the support department, engineers from the system department were not physically involved in the router configuration. As a result, even with the correct configuration, the PCs were not receiving any Internet through the static IP addresses.

## 8.2 Solution of those Problems

I addressed the challenges that arose during my internship with the support of my supervisor and engineers working in the SBL project overcame the problems that were faced . My internship experience was a mix of learning and working at the same time. My supervisor first introduced and educated me on the fundamentals of network engineering, as well as the kind of commercial work that was being done in this area of the business, to ensure that I was familiar with SBL's field of work. This aided me in overcoming the challenges and problems I encountered while building SBL's network.

**Adjusting to Corporate Culture:** At SBL, my seniors and coworkers, particularly my supervisor, were genuinely helpful, which gave me the courage to open up and contribute more to the project's operations. Seniors at the organization assisted me in better understanding networking fundamentals and how an ISP manages networks, allowing me to comprehend the project more clearly and put more effort into it. Their enthusiasm inspired me to ask questions, step beyond of my comfort zone, and gradually adjust to the firm's corporate culture.

**Requirement Analysis of Equipment:** Our team did a survey for SBL's office before working on equipment installation and LAN connections. The poll included us, the interns, and a young network engineer to learn about the SBL office's architecture as well as the officers' preferences for desktop configuration. This aided in determining the amount of equipment required for this endeavor.

**Routing Configuration:** My supervisor's suggestion was the only way I was able to fix routing configuration issues. The goal was to learn more about Cisco routers and network settings by taking the CCNA course and then applying the theories to the system department's job. This aided in the learning process, as engineers often do not allow interns to participate in the setup of routers and switches, but my supervisor had faith in me and assigned me small configuring chores so that I could get experience.



# Chapter 9

## Future Work & Conclusion

### 9.1 Future Works

Working as an intern at Sonali Bank Limited has encouraged me to pursue a career as a network engineer. Working in a network-based organization was a key learning aspect about the functions of work in the Computer Networks sector, which has a large field of commercial work. There are various categories of labor linked to networking in Bangladesh, including banking, ISP firms such as BBTS, and communications companies such as Grameenphone. Working for an ISP is a great way to learn the fundamentals of networking. Although higher-level network architecture and analysis are not required, the fundamentals of how a network is built and how a service is supplied can be learnt. I was not only learning and working on the network development project at SBL, but I was also being prepared for future employment opportunities not just with the company, but also in several fields as a professional, [12] such as:

**Network Analyst:** A network analyst is in charge of setting up and maintaining a network within a company. Many network analysts discover that they are involved in both the business and technical aspects of their organizations. A network analyst is responsible for designing, planning, analyzing, and providing technical support for the organization's data transmission networks or groups of networks.

**Network Specialist:** A network specialist's day-to-day responsibilities include monitoring groups of PCs that communicate with one another and ensuring that customers have the necessary networks for their business needs. A network specialist is in charge of making sure the network is up and running. This could entail gathering data on the network's performance, monitoring network security, and resolving issues as they arise.

**Network Solutions Architect:** Current and future networking and

telecommunication infrastructure standards are defined by the network solutions architect. The ideal applicant has firewall experience, a working knowledge of Linux/Unix setups, a working knowledge of VLANs, VSANS, and Hypervisors, and a working knowledge of internet routing, connection, and wireless access point configuration.

**Network Security Specialist:** A network security specialist assists computer networks by identifying, preventing, and resolving attacks. In addition, a person in this role assesses security risks and implements security measures to counter them. Installing computer security software, building and testing software deployment tools, providing user documentation, and conducting security audits are all examples of secondary responsibilities.

**Cloud Networking Architect:** A cloud networking architect collaborates directly with customers to help them deploy infrastructure that fulfills their technical and business requirements. The candidate must have extensive understanding of cloud technologies, as well as experience migrating networks to the cloud, the ability to resolve network-related issues, the capacity to troubleshoot, and effective verbal and written communication skills.

## 9.2 Conclusion

Sonali Bank Limited provided me with an excellent learning opportunity during my internship. Because I live so far away from the workplace, it was difficult to stay committed to visiting office hours. This internship gave me the opportunity to get a taste of what networking in a bank would be like. I had also adjusted to the business culture.

This internship allowed me to study the fundamentals of networking and how all seven layers of the OSI model play a role in the creation of any network. My supervisor has also taught me a lot by assisting me in navigating and understanding what was expected of me as well as providing me with tips on how to make the work easier. My boss recommended that I begin taking online Cisco Certified Network Associate classes, which greatly aided me in fully comprehending the tasks of our SBL project. Practical understanding of networking equipment is also essential in this sector, as many networking components are required to make a link.

During my internship, I first learnt about the functions of the seven layers of the OSI model from a practical standpoint, then progressed to learning about how a network is

built and what networking equipment is required to operate it.

assemble a network It was critical to learn about the equipment because the diverse functions of wires, routers, and switches influenced the quality of the connection. Cisco routers and switches are a crucial networking engineering aspect in this industry, and I've learnt about them. I learned how to set up routing setups including NAT, DHCP, OSPF, SSH, TELNET, and IP address allocations, as well as the switing configuration included the PCs in Vlan.

Finally, I'd like to express my gratitude to my university supervisor, who assisted me in writing my internship report, as well as my supervisor from Sonali Bank Limited, who introduced me to the practical work of network engineering by assisting me with SBL's project and showing me the way to achieve the best results. Their suggestions helped me get through the internship. Their encouragement and motivation have given me the confidence to work as a network engineer in the field of networking and to strive for success in future project work.

# Bibliography

- [1] "<https://www.sonalibank.com.bd/>,"
- [2] C. network, "<https://uit.stanford.edu/service/network>," *Campus networks*.
- [3] "<http://web.mit.edu/acs/athena.html>," *Campus networks*.
- [4] "Ppdioo lifecycle approach to network design.,"
- [5] "'sonali bank annual report 2020,' [https://www.sonalibank.com.bd/pdf file/annualreport/2021/annual report 2020.pdf](https://www.sonalibank.com.bd/pdf%20file/annualreport/2021/annual%20report%202020.pdf),"
- [6] "A. goryachev, d. toh, and t. lee, "the functional requirements, network topology," biosystems, vol. 83, no. 2-3, pp. 178–187, 2006.,"
- [7] "J. cleland-huang, r. settimi, o. benkhadra, e. berezhanskaya, and s. christina, "managing non-functional requirements in networks," in proceedings. 27th international conference on software engineering, 2005. icse 2005., pp. 362–371, ieee, 2005.,"
- [8] "Feasibility study and its importance.,"
- [9] "<https://www.sonalibank.com.bd/>,"
- [10] "Sustainability in project management.,"
- [11] "'ethics in business networking.',"
- [12] "'network engineering.',"