

**INTERNSHIP REPORT ON COMPUTER NETWORKS
(NETWORK ENGINEERING-BTCL)**

BY

**TOFAYEL BEPARI
ID: 201-15-13621**

This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Saiful Islam

Assistant Professor

Department of Computer Science and Engineering
Daffodil International University

Co- Supervised By

Dewan Mamun Raza

Lecturer (Senior Scale)

Department of Computer Science and Engineering
Daffodil International University



DAFFODIL INTERNATIONAL UNIVERSITY

DIU ROAD, DHAKA 1341, BANGLADESH

JANUARY 2023

APPROVAL

This Project/internship titled “INTERNSHIP REPORT ON COMPUTER NETWORKS (NETWORK ENGINEERING-BTCL)”, submitted by Tofayel Bepari, ID No: 201-15-13621 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 19-01-2023.

BOARD OF EXAMINERS

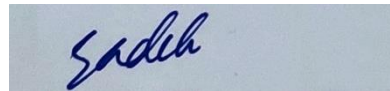


Dr. Touhid Bhuiyan

Professor and Head

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Chairman

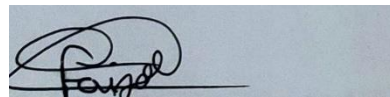


Md. Sadekur Rahman

Assistant Professor

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner

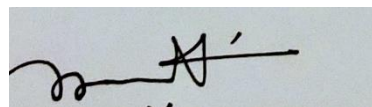


Fahad Faisal

Assistant Professor

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Internal Examiner



Dr. Mohammad Shorif Uddin

Professor

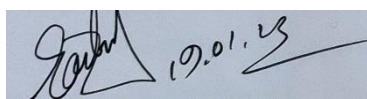
Department of Computer Science and Engineering
Jahangirnagar University

External Examiner

DECLARATION

I have completed this internship under the supervision of **Saiful Islam, Assistant Professor**, Department of CSE, Daffodil International University and Co-Supervised by **Dewan Mamun Raza, Lecturer (Senior Scale)**, Department of Computer Science and Engineering, Daffodil International University. I declare that neither this intern nor any part of this intern has been submitted to any university for awarding a degree or diploma.

Supervised by:



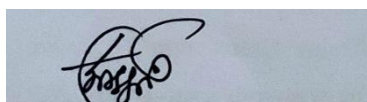
Saiful Islam

Assistant Professor

Department of CSE

Daffodil International University

Co-Supervised by:



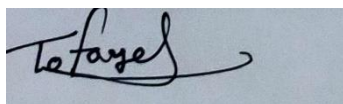
Dewan Mamun Raza

Lecturer (Senior Scale)

Department of CSE

Daffodil International University

Submitted by:



Tofayel Bepari

ID: -201-15-13621

Department of CSE

Daffodil International University

ACKNOWLEDGEMENT

Firstly, thank the almighty ALLAH for giving me a chance to live peacefully and making it possible to complete my final year internship successfully.

I am grateful and wish our profound indebtedness to **Saiful Islam, Assistant Professor**, Department of CSE, Daffodil International University and Co-Supervised by **Dewan Mamun Raza, Lecturer (Senior Scale)**, Department of Computer Science and Engineering, Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of “*Computer Networking*” to carry out this internship program. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, redounding many inferior drafts, and correcting them at all stages impressed me. It made it possible to complete this internship program.

I also; would like to express our cheerful gratefulness to Dr. Touhid Bhuiyan, Head, Department of CSE, for his kind help in finishing our internship and also to other faculty members (Especially; Dr. Sheak Rashed Haider Noori, Professor & Associate Head, Department of Computer Science and Engineering, Daffodil International University and the staff of CSE department of Daffodil International University.

I want to thank our course mate of Daffodil International University and from other universities who participated in this discussion while completing the course work.

Finally, I am so happy that I finish the internship with pleasure. I am very thankful to all the people who helped me during and before/after the internship program.

ABSTRACT

The purpose of this report is to document the successful completion of my internship under the supervision of Saiful Islam. I have completed an internship at Bangladesh Telecommunications Company Limited (BTCL), a core company for evaluating of telegraphs and telephones in Bangladesh. BTCL owns and operates almost all of the country's copper, fiber optic, and microwave networks. BTCL gives almost all kinds of services related to the telecommunication sector in Bangladesh. Like, voice carrier, IGW, IIG, ICX, ISP, NGN, and PSTN operator, as well as a registrar of cc domains (.bd). I have worked there as a team many times since it was four months of duration, which is a long time. I have performed many operations with my team and sometimes individually. Most of the time, I performed GPON and ADSL connection and troubleshooting.

In this report, I have mentioned several things related to telecommunication and networking. IMS is one of the essential parts of the Soft switch division of BTCL; I was there during the third month of my internship. This company has a huge collection of equipment, and the trainer/teacher was very sophisticated, this is why I am glad to be a part of BTCL's team. In this report, you can figure out my findings about my internship in network engineering.

TABLE OF CONTENTS

CONTENTS	PAGE
Approval	ii
Board of examiners	ii
Declaration	iii
Acknowledgements	iv
Abstract	v
Table of contents	vi-viii
List of table	ix
List of figure	x
CHAPTER 01: INTRODUCTION	1-3
1.1 Introduction	1
1.2 Motivation	1
1.3 Internship Objectives	1-2
1.4 Introduction to the Company	2
1.5 Report Layout	3
CHAPTER 02: Organization	4-11
2.1 Introduction	4-5
2.2 Product and Market Situation	5

2.2.1 Telephone	6
2.2.2 GPON	6
2.2.3 ADSL	6
2.2.4 LLI	6
2.2.5 VPN	6
2.2.6 NIX	6
2.2.7 Chace	6-7
2.2.8 Co-Location	7
2.2.9 Backhaul	7
2.2.10 Domain & Hosting	7
2.2.11 IPLC	7
2.2.12 ICX & IGW	7
2.2.13 Alap	7
2.3 Target Group	7-8
2.4 SWOT Analysis	9-10
2.5 Organization Structure	10-11
CHAPTER 03:Tasks, Projects and Activities	12-22
3.1 Daily Tasks and Activities	12
3.2 Events and Activities	12-13
3.3 Project Task and Activities	13
3.3.1 PSTN	13
3.3.1.1 PSTN Architecture	14
3.3.1.1 PSTN working Mechanism	14-15
3.3.2 ADSL	15-16
3.3.2.1Working technique of ADSL	16-17

3.3.3 GPON	17-18
3.3.3.1 How does GPON Works?	18-20
3.3.3.2 Power measurement and loss of optical fiber connection	20-21
3.4 Challenges	21-22
CHAPTER 04:Competencies and Smart Plan	23-24
4.1 Competencies Earned	23
4.2 Smart Plan	23
4.3 Reflections	24
CHAPTER 05:Conclusion and Future Career	25-26
5.1 Discussion and Conclusion	25
5.2 Scope for Further Career	25
APPENDIX	26
APPENDIX A: Internship Reflection	26
Appendix B: Company Detail	26
REFERENCES	27

LIST OF TABLES

TABLES	PAGE NO
Table 1.1: Organization Info	2
Table 1.2: Report Layout	3
Table 2.1: SWOT analysis, Strengths and Weaknesses	9
Table 2.2: SWOT analysis, Opportunities and Threats	10
Table 3.1: ADSL data rate with different distance	17

LIST OF FIGURES

FIGURES	PAGE NO
Figure 1.1:BTCL logo	2
Figure2.1: BTCL's old logo was named BTTB	4
Figure 2.2: BTCL logo	4
Figure 2.3: All services of BTCL	5
Figure 2.4: Organizational Structure of BTCL	11
Figure 3.1: Visiting soft-switch room and monitoring	12
Figure 3.2: PSTN telephone	13
Figure 3.3: PSTN main distribution Switch room and Working	14
Figure 3.4: A working diagram of the PSTN telephone system	15
Figure 3.5: Diagram of ADSL	16
Figure 3.6: Working diagram of GPON	18
Figure 3.7: ODF to Cabinet connection diagram of GPON	19
Figure 3.8: Fiber core connection and power measurement	20

CHAPTER 1

Introduction

1.1 Introduction:

If I make it simple, networking is the virtual connection between two people, two devices, two companies, and two countries. Networking is also known as computer networking; it is a method of transferring and exchanging data between nodes over shared media in information systems.

1.2 Motivation

Since I was a kid, I have had a great fascination with computers and electrical devices. At an early age of my life, I often played games with electrical toys such as toy electric cars and other toys. My uncle often called me an engineer. When I was growing up, one thing set in my mind, I would be an engineer when I grew up. A dramatic change happened in my mind when I shifted to my brother's home in Munshiganj. I got courage by seeing my brother work on the computer. Then I decided to go with computer engineering in my life. That is why; I have completed a 4 years diploma from Munshiganj Polytechnic Institute. Meanwhile, I got a fascination with computer networking and hardware. Hence, I tried computer coding but unfortunately, it did not go with my passion.

1.3 Internship Objectives

The main objective of this internship is to understand the field of networking. There are several objectives of this internship program. Those are,

- i. Be able to learn Computer Networking. More specifically, optic fiber connection and copper cable connection.
- ii. Able to work with a corporate team.
- iii. Learn the office environment of a leading company in Bangladesh.
- iv. To understand the current job market in Bangladesh as we are at the end of our graduation.

- v. Fulfillment of the academic requirements of computer science and Engineering studies in a specific field.

1.4 Introduction to the Company

BTCL (Bangladesh Telecommunication Company Limited) (Figure 1.1) is one of the largest telecommunications company in Bangladesh. In 1971, following the victory of the liberation war in Bangladesh, BTCL was established as named BTTB (Bangladesh Telegraph and Telephone Board). The BTTB become a public limited company and was renamed BTCL (Table 1.1: Organization Info) on July 1, 2008. BTCL provides landline telephone services in Bangladesh, including domestic and international high-distance Internet services.



Figure 1.1: BTCL logo [10]

Table 1.1: Organization Info

Point	Information	Description
Name	Bangladesh Telecommunications Company Limited (BTCL)	Company's full name
Address	Head Office: 37/E, Telejogajog Bhaban, Eskaton Garden, Dhaka	Company's detailed address
Telephone	+880 2 48311500	Company's telephone number
Email	md@btcl.gov.bd	Company's email address
Website	www.btcl.gov.bd/	Company's website
Type of Organization	Telecommunications Company	Organization type

1.5 Report Layout

Table 1.2: Report Layout

Chapter No	Description
Chapter-1	The motivation and objective of this internship are described in this chapter. I gave a brief about my motive in this internship in this chapter.
Chapter-2	In this chapter, I have described the internship company in depth and its' products & services, so when implementing the services and their details, I also give a try to implement the company structures as my knowledge.
Chapter-3	This is the lion share of this report; I will describe my daily works as possible and activities along with the events I have attended.
Chapter-4	This particular chapter describes how I felt. I shared about the internship, the pros and cons. What the difficulties were, and my future career as a CSE engineer.
Chapter-5	This chapter will refer to my future carrier thinking and the conclusion of the internship.

CHAPTER 2

Organization

2.1 Introduction:

The largest telecommunication company in Bangladesh is 'Bangladesh Telecommunication Company Limited' (BTCL). After Bangladesh's independence in 1971, it was established as the Bangladesh Telegraph and Telephone Board (BTTB) (Figure 2.1: BTCL's old logo is named BTTB).



Figure 2.1: BTCL's old logo named BTTB [11]

The BTTB (Figure 2.1: BTCL's old logo named BTTB) became a public limited company and was renamed BTCL on July 1, 2008, (Figure 2.2: BTCL logo) BTCL logo. BTCL was originally owned entirely by the Bangladesh government. However, it announced that the stock would be sold to the public the following year. BTCL is expected to be worth Tk. 15,000 crore. BTCL hires a total of 12,636 employees.



Figure 2.2: BTCL logo [10]

BTCL (Figure 2.2: BTCL logo) provides landline telephone services in Bangladesh, including domestic and international high-distance Internet services. In 2004, Bangladesh's government gave private companies several PSTN (Public Switched Telephone Network) licenses. However, they are forbidden from trading in the

lucrative Dhaka market (which covers for most of the national market). The monopoly held by BTCL was broken, when other operators began to obtain licenses in 2007.

2.2 Product and Market Situation

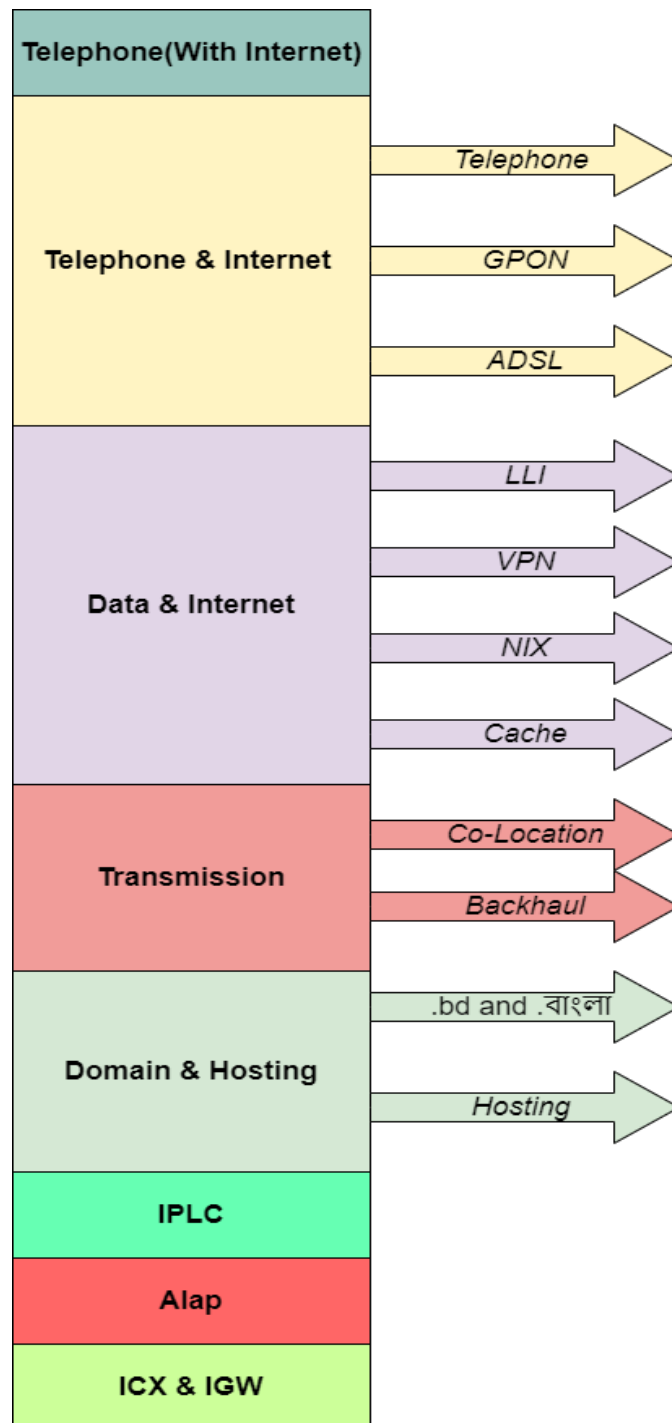


Figure 2.3: All services of BTCL

2.2.1 Telephone: A telephone is a telecommunications device that allows two or more people to have a conversation when they are too far apart to hear directly. BTCL gives us a Low Call rate, clear voice, no hassle of charging, and environment-friendly, hygienic telephone service. This is the core service of BTCL (Figure 2.3: All services of BTCL).

2.2.2 GPON: GPON stands for Gigabit Passive Optical Network. GPON uses an Asynchronous Transfer Mode (ATM) for voice, Ethernet for data, and a proprietary encapsulation for voice. This means using fixed-size cells instead of variable-size data packets. Provides GBPS faster than EPON (Ethernet Passive Optical Network) in downstream and upstream bandwidth. This is the latest technology and the most popular for internet connection. BTCL provides this service with minimum cost. We will discuss more GPON later.

2.2.3 ADSL: Asymmetric Digital Subscriber Line (ADSL) is a type of Digital Subscriber Line (DSL) mechanization that allows data transportation over copper telephone lines at higher speeds than traditional voice-band modems can provide. Technology. ADSL is the cheapest for giving an internet line because it uses a copper cable connection.

2.2.4 LLI: Leased Line Internet is a kind of internet connection using optical fiber. In this internet connection, the speed is fixed which means it is not a shared line means a real IP is given to the user.

2.2.5 VPN: VPN stands for "Virtual Private Network" and is a service that protects our internet connection and online privacy (Figure 2.3). It builds an encrypted channel for our data, hides our IP address to protect our online identity, and grants us to use public Wi-Fi hotspots safely.

2.2.6 NIX: NIX (National Internet Exchange) facilitates Internet service providers (ISPs) and content providers to connect locally and regionally in an adequate and economical manner.

2.2.7 Cache: The main purpose of caching is to improve data improvement performance by decreasing the essential to approach the underlying slow storage layer.

Unlike databases, whose data is usually complete and permanent, caches typically store a subset of data temporarily, trading capacity for speed.

2.2.8 Co-Location: A colocation facility (colo) is a data center address where companies can rent space for servers and other computing hardware. Colo typically arranges the building, cooling, power, bandwidth, and environmental security, while the customer adds the servers and storage.

2.2.9 Backhaul: Backhaul carries signals from a faraway location or network to another location, commonly a central location. Backhaul commonly means high-capacity lines. High-speed lines are able of transmitting very high speeds and high bandwidths.

2.2.10 Domain and Hosting: The major difference between a domain and hosting is that a domain is an address where visitors can easily find our website online whereas hosting stores your website's files. BTCL is one of the common Domain & Hosting service providers in Bangladesh.

2.2.11 IPLC: International Private Leased Circuit (IPLC) is a privately leased line between two or more points. Its' setup is a point-to-point architecture and users can access the internet, data exchange, and video and voice communication capabilities.

2.2.12 ICX & IGW: ICX is the interconnection exchange that distributes international calls, and IGW routes all incoming international calls to the ICX received from International Gateway (IGW).

2.2.13 ALAP: ALAP is an IP-based app developed by BTCL, which provides IP calling to ALAP to ALAP or other operators, and customers can watch IP television for a cheap cost.

2.3 Target Group

There are several projects and groups BTCL is involved with. Some of those are-

- i. Making Wi-Fi Internet Services through Optical Fiber Cable connection in Government Educational and Training Institutes (Phase 2).
- ii. For the Rooppur Nuclear Power plant establishing External Telecommunication Network.
- iii. Making fundamental telecommunication network in economic zones (Phase 1).
- iv. At Mirsharai Economic zone in Chattogram installation of telecommunications network.
- v. Making development of Switching & Transmission Network to Strengthen Digital Connectivity.
- vi. Replacement of old Digital Telephone System of Dhaka city (171 KL).
- vii. Insertion of Wireless Broadband network for Digital Bangladesh (4G, LTE).
- viii. Optical Fiber Cable Network development at Upzilla level (290 Upazilla).
- ix. Optical Fibre Cable Network development in 1000 Union Parishad (1006 Union Parishad) Contact: Project Director, OFCNDP in 1000 UP Phone: 9320258 Project Summary (12 Nov 2014).
- x. Expenditure of 5G-compliant Optical Fibre Transmission Network of BTCL.
- xi. All the landline telephone users are customers of BTCL.
- xii. Some major ISP are also customers; who bought internet from BTCL and serve it locally.

2.4 SWOT Analysis

Table 2.1: SWOT analysis, Strengths and Weaknesses

Strengths	Weaknesses	Description
1. BTCL is the largest national landline service provider in Bangladesh.	1. BTCL's brand image is inferior to other similar companies.	This row tell about the company size and about the brand image
2. BTCL is the alone landline telephone benefit that offers fax and internet facilities, providing network and telecommunications facilities nationwide.	2. BTCL must have the machinery needed to take advantage of the vast amount of available subsea cable bandwidth.	You can see here the beneficial combine offer and as well as the lake of machinery.
3. BTCL can offer its consumers a genuinely integrated service package with landlines, internet facilities and toll-free channels.	3. The organization's CSR activities are inferior to those of other telecommunications companies.	In this row, I placed BTCL's genuinely integrated services and CRS activity.
4. Experience in the telecommunications industry since 1979.	4. Latency to connect to BTCL is longer than that of commercial mobile operators.	This row talks about the experience along with latency of connection.
	5. BTCL has fewer qualified employees than private companies.	This row talks about the qualification of the company's employ.
	6. BTCL's Insufficient connection capacity to satisfy mobile phone service requirements provider.	Here is the talk about the insufficient connection capacity of BTCL.

Table 2.2: SWOT analysis, Opportunities and Threats

Opportunities	Threats	Description
1. The government recently incorporated BTCL and appointed a new board of directors to improve the quality of its services.	1. The growth of mobile phones and the introduction of personal fixed phones.	This row says, BTCL recently got a new board of directors from government and says the growth of mobile phone can be a threat for BTCL.
2. The government sets a call rate for all NWD calls, which is always 0.30 tk/min for landlines and 0.65 tk/min for mobiles.	2. People can get cellular connectivity in sets for cheaper rates than before.	The government set a fixed call rate as well as public can use cellular connectivity cheaper than BTCL's call rate.
3. The government has raised taxes and tariffs on mobile phones and sims in the new budget.	3. Services and other facilities provided by mobile operators are superior to BTCL.	It tells government raises tax for mobile phone this can be an opportunity for BTCL and says private operator's services are better than BTCL's services.
4. There is a lot of untapped potential in telecom, made possible by BTCL's high quality network and low fees.	4. Huge contributions in mobile phone companies' promotions, such as advertising and CSR activities, leave a better impression on customers than BTCL.	This row illustrate the potentials of BTCL and the mobile operator's aggressive marketing is a threat for BTCL.

2.5 Organizational Structure

The Bangladesh T&T Board is a government agency under the Ministry of Posts and Telecommunications (MOPT). The Board consists of one Chair(Figure 2.4: Organizational Structure of BTCL), four full-time members, and three non-full-time members, all appointed by the Government of the People's Republic of Bangladesh.

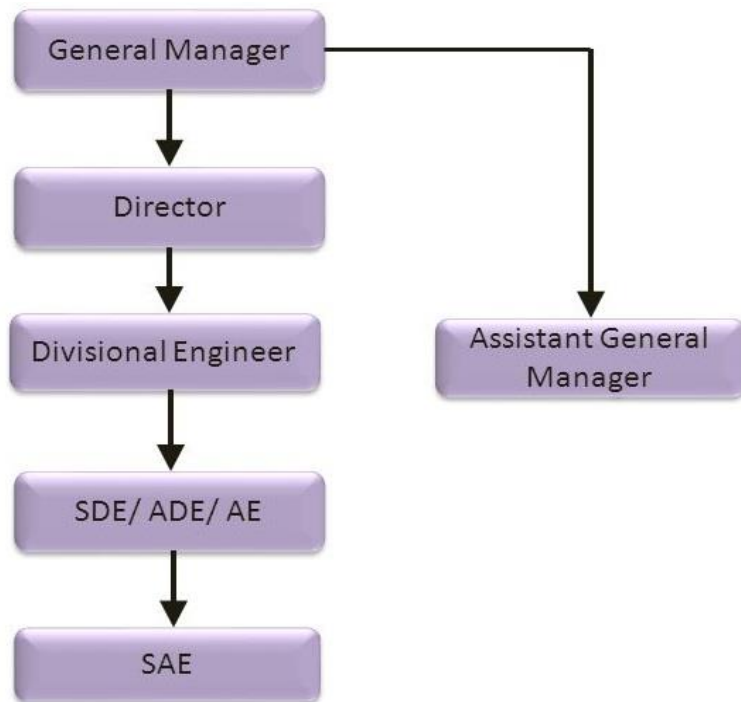


Figure 2.4: Organizational Structure of BTCL

CHAPTER 3

Tasks, Projects and Activities

3.1 Daily Tasks and Activities

My internship company, Bangladesh Telecommunications Company Limited, had long working hours, and I had to be there five days a week, from Sunday to Thursday. In this role, I was responsible for observing corporate network structure both theoretically and practically, monitoring client routers with their service team, finding basic problems related to computer hardware and networks, and troubleshooting operating systems. I have installed software such as Antivirus, Microsoft Office, Team Viewer and many other utilities on theirs' computer and work with their core ERP software BOSS. Fix hardware issues like replacing a shoddy keyboard, replacing a broken screen, replacing a damaged hard drive, replacing memory (RAM), and many other hardware issues. I was not involved in their internal meetings or other Internet-related matters. I often worked as a team for the GPON (Optic Fiber Network) and ADSL (Copper Cable Connection) network fieldwork.



Figure 3.1: Visiting soft-switch room and monitoring

3.2 Events and Activities

An internship cannot only be completed with training. At the beginning of my internship, in-house, I had a basic brief on PSTN (Public Switched Telephone Network), GPON (Gigabit Passive Optical Network) and ADSL (Asymmetric Digital Subscriber Line). I attended this seminar because I wanted to learn how to operate an optical network system and how to build an ISP business. To understand the network system's requirements necessary documentation was provided, group discussions were arranged, and the company's field service engineers allowed us to resolve many issues to examine our basic knowledge in computer networking. My official training and instruction explained how the network actually works.

3.3 Project Task and Activities

In the project task and activities, I was involved with many works like PSTN, ADSL and GPON. I am giving a brief explanation about it here.

3.3.1 PSTN

PSTN states Public Switched Telephone Network (Figure 3.2). This is a traditional circuit-switch telephone network. It used since the 1800s. For many years, this legacy infrastructure has given the communication channel with honor for homes and companies like a dependable way to communicate with anyone around the globe using underground copper lines. There are different names for the actual phones exist, including PSTN, landlines, Plain Old Telephone Service (POTS), and fixed-line telephones.



Figure 3.2: PSTN telephone [12]

3.3.1.1 PSTN architecture

The classic PSTN features uses a star topology and a hierarchical architecture. The local exchange, which communicates with trunk exchanges, leading exchanges, and central exchanges, is where each subscriber line is connected. A local exchange typically uses the same area code means the telephone network depend on area codes (Figure 3.3: PSTN Switch room and Working). The user must add an area code when dialing, the user when dialing the number from outside the local exchange. A user must dial the country code to place an international call.



Figure 3.3: PSTN main distribution Switch room and Working

3.3.1.2 PSTN Working Mechanism

First, the sender's telephone converts sound waves into an electric signal and the electric signal is sent to 171KB soft switch (Figure 3.4: A working diagram of the PSTN telephone system) then it comes to the Media Gateway for Mobile Networks (MGW) with MUX. After DEMUX, the telephone call comes to the destination's nearby switch room. There are several voice cards in a switch and it has two side MGW site and MDF site. Then the signal passed to the MDF (Main Distribution Frame). MDF has a Switch side (Horizontal) and an OSP side (Vertical), there is a fuse between the two sides for in case of an emergency. The OSP side outs two cables

to the cable chamber. From 171KB to now it was an inside house process, from now the outside house process starts. Now, several cables are arranged to several cabinet's MDF sides.

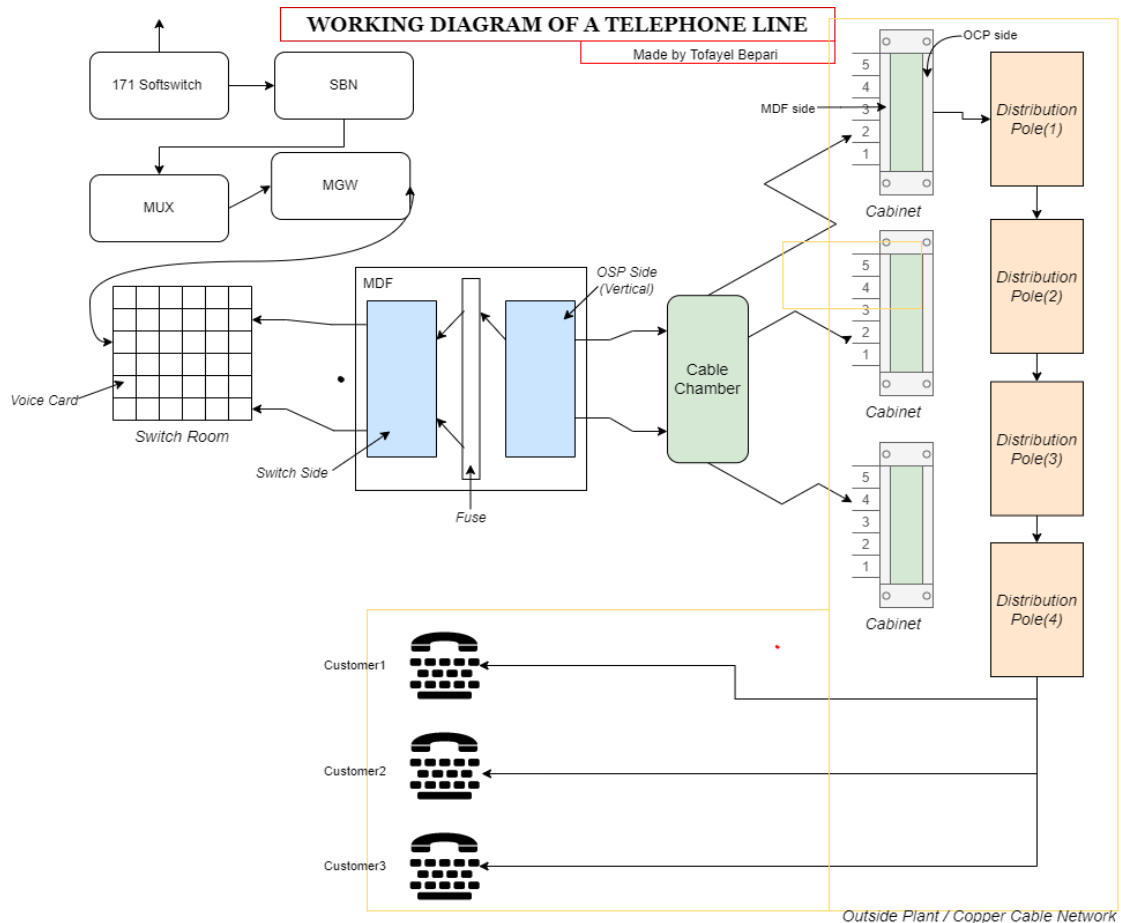


Figure 3.4: A working diagram of the PSTN telephone system

The distribution pole's connections come from OCP sides of cabinets. Customer can access their telephone by arranging a cable connection from the distribution pole.

3.3.2 ADSL

Asymmetric Digital Subscriber Line (ADSL) is a technology that allows high-bandwidth, quick data transmission to homes and companies over already-existing copper wire telephone lines. In contrast to standard dial-up copper telephone line service, ADSL offers always-on, continuously accessible broadband connections.

ADSL is a form of DSL, a data communications technology that enables faster data transmission over copper telephone lines. ADSL is capable of providing up to 50 Mbps, and supports voice, video and data. ADSL is a popular Broadband Choice in the World with major market share. ADSL is now available in every region of the world

In that, it uses the majority of its channels to transmit data downstream to the user and only a tiny very small portion of them to upload data from the user, ADSL is asymmetric. It is often provided with downstream internet connection data speeds ranging from 512 Kbps to around 6 Mb/s (Mbps).

3.3.2.1 Working technique of ADSL

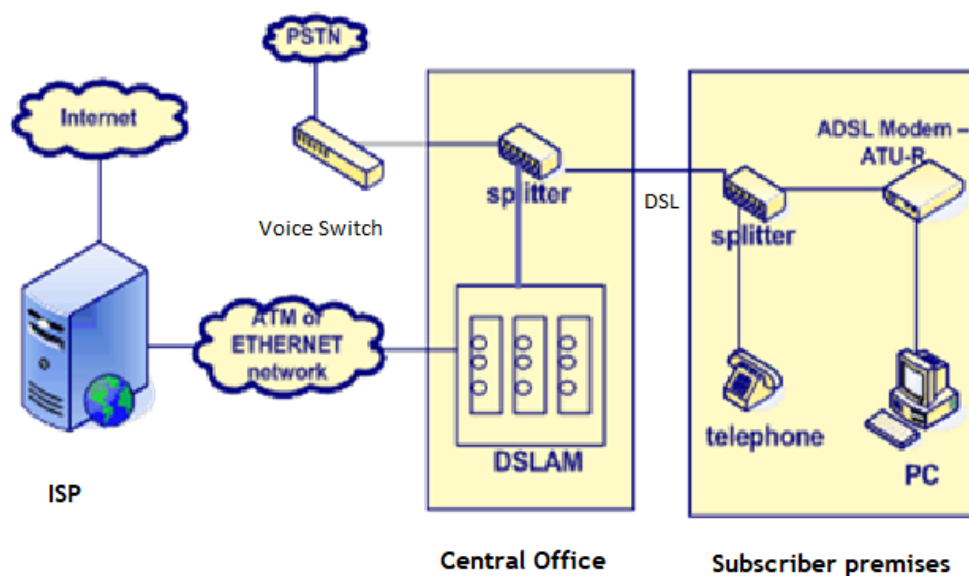


Figure 3.5: Diagram of ADSL [13]

The concept of ADSL is that because voice does not take nearly all of the bandwidth provided by a conventional copper twisted pair line, it is possible to maintain both a high-speed data connection and a voice connection at the same time. To achieve this, ADSL divides the copper wire connection's maximum 1MHz bandwidth into 4 kHz channels, using only the bottom 4 KHz channel for analogue modem data, fax, and POTS calls. Digital communication is conducted in parallel using the remaining 256

available channels. Due to the asymmetry, only 64 of the 192 4 kHz channels are utilized for the uplink and 192 for the downlink.

In order to enable simultaneous usage of the landline and the ADSL modem, ADSL operates on existing copper phone lines (Figure 3.4: Diagram of ADSL) by isolating the bands with higher frequencies using a DSL filter, also known as a splitter. The line terminates at the DSL access multiplexer (DSLAM) at the central office; or telephone exchange, where an additional splitter separates the voice signal from the phone network. The one-way nature of the majority of multimedia communication, in which a considerable amount of information flows toward the user and just a tiny amount of interactive control information is back, is something that ADSL was created to take advantage of. The data rate of ADSL depends on the distance and core size of the wire (Table 3.1). It is a more inexpensive way to access the internet at faster rates compared to a traditional dial-up connection.

Ignoring bridged taps, ADSL will perform as follows-

Table 3.1: ADSL data rate with different distance

Data Rate	Wire Gauge	Wire Size	Distance
1.5/2 Mbit/s	24 AWG	0.5mm	5.5 km
1.5/2 Mbit/s	26 AWG	0.4mm	4.6 km
6.1 Mbit/s	24 AWG	0.5mm	3.7 km
6.1 Mbit/s	26 AWG	0.4mm	2.7 km

3.3.3 GPON

Gigabit passive optical network is referred to as GPON. For voice, GPON employs Asynchronous Transfer Mode (ATM), Ethernet for data, and proprietary encapsulation for voice. This indicates that it uses fixed-sized cells as opposed to data packets of varying sizes. On both the downstream and upstream bandwidths, it provides quicker Gbps than EPON (Ethernet passive optical network).

An optical line terminal (OLT) in a GPON system uses a passive optical distribution network to link numerous optical network terminals (ONTs/ONUs) together (ODN).

3.3.3.1 How GPON works?

The point-to-multipoint access fiber optic (Figure 3.5) network topology of GPON is essential to its functionality. An OLT (Optical Line Terminal) (Figure 3.5), an ONU device (Optical Network Unit), and a passive splitter are the three primary components of GPON. Here, the passive optical splitter, which normally divides the signal into up to 64 others, permits the use of just one optical fiber cable (Figure 3.6: Working diagram of GPON) to link the internet service provider to numerous end customers.

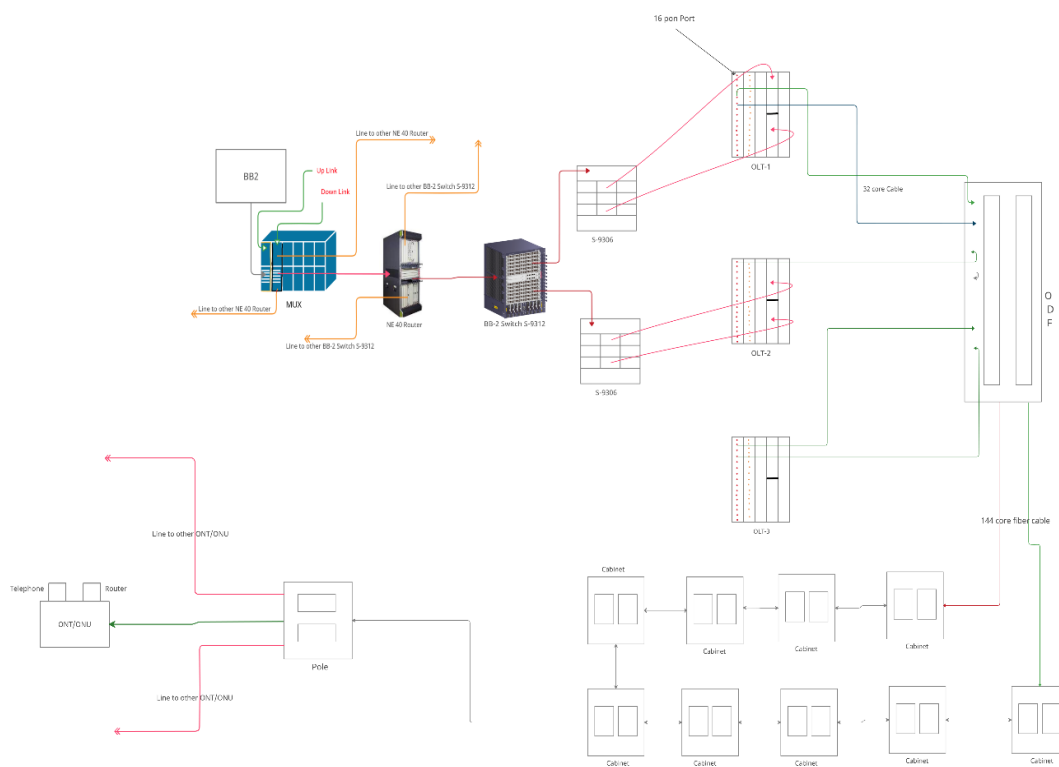


Figure 3.6: Working diagram of GPON

How then does the whole process go?

Here is a brief justification:

First thing here to mention, optical Wavelength Division Multiplexing (WDM) is used by the Optical Line Terminal (OLT) to transport data in the form of optical signals. The OLT, which is often your ISP, can be thought of as the GPON's entry point. Over an optical distribution network (ODN), the signal travels along a single fiber until it reaches the passive splitter at the other end. A GPON fiber network has a 20-kilometre maximum range. The optical signal is received by the passive GPON splitter (Figure 3.6: Working diagram of GPON), which divides it into up to 64 signals. Point-to-multipoint access is made possible via this, allowing for up to 64 fiber connections. The split optical signals finally make it to individual GPON ONT/ONU devices installed on the premises of a home or company during the last mile. This serves as the GPON's termination point and makes it possible to transform optical data signals into electrical signals. Data is also transmitted downstream from the GPON ONT/GPON ONU (Figure 3.7: ODF to Cabinet connection diagram of GPON) to the OLT in the opposite direction.

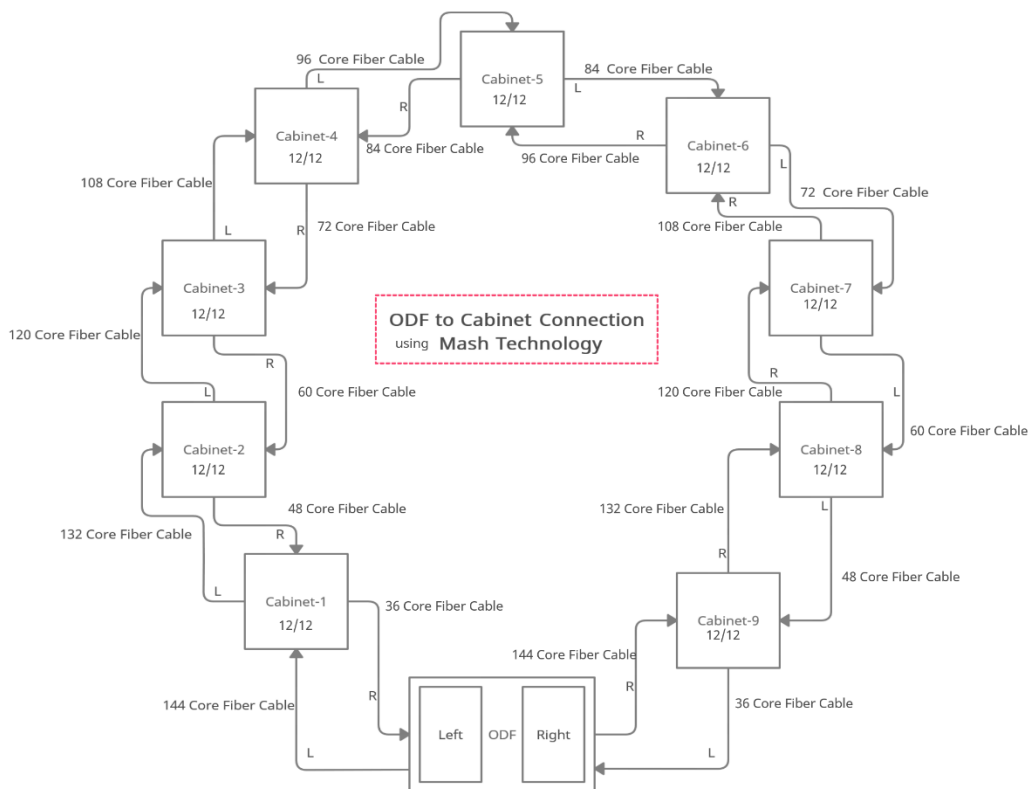


Figure 3.7: ODF to Cabinet connection diagram of GPON

GPON Connection Procedure:

- ✓ First, check the power at DP with optical power meter.
- ✓ Draw optical drop cable from DP to customer premises.
- ✓ Splice the optical drop cable with the DP pigtail.
- ✓ Splice other end of optical drop cable with another pigtail, which inserted inside the ATB box.
- ✓ Connect ONT or MDU with ATB box through an optical patch chord.
- ✓ Connect ONT or MDU with Router/PC/Phone by using LAN cable.



Figure 3.8: Fiber core connection and power measurement

3.3.3.2 Power measurement and loss of optical fiber connection

The main equation used to measure dB when the power is calculated in watts is:

$$\text{dB} = \log_{10} (\text{measured power}/\text{reference power})$$

Measuring Power

dBm units are used to express optical power measurements. The milliwatt reference power is indicated by the letter "m" in the term "dBm." The power of a source with a power level of 0 dBm is therefore 1 milliwatt. Similar to how 0.1 milliwatt equals -10 dBm and 10 milliwatts equals +10 dBm. Source power for fiber optics can range from -20 dBm to +20 dBm, while receiver power can be as low as -40 dBm.

$$\text{dBm} = 10 \log (\text{measured power} / 1\text{mw})$$

When the power measured is 1mw, the equation becomes:

$$\text{dBm} = 10 \log (1\text{mw} / 1\text{mw}) = 10 \log (1) = 0 \text{ dBm} \text{ or } \text{dBm} = \text{measured power(dB)} - \text{reference power (0dB)} = \text{dB} = \text{measured power(dB)} - 0$$

Calculating Loss

In a fiber optic system with loss, the measured power is less than the reference power (Figure 3.8), resulting in a measured power to reference power ratio that is less than 1, a logarithmic value that is negative, and a dB value that is negative. Since the reference value we specified and the value the meter is reading are the same, the meter reports "0 dB" when the reference value is set. The power measured is thus lower when we measure loss, so the meter will, for instance, display "- 3.0 dB" if the tested power is half the reference amount. Despite the fact that meters record a negative value for loss, we typically say the loss is a positive number, therefore when the loss is measured as 3.0 dB when the meter read -3 dB.

$$\text{dB} = \text{measured power(dB)} - \text{reference power (dB)} = -22.3 \text{ dBm} - (-20\text{dBm}) = -22.3 + 20 = -2.3 \text{ dB} \text{ (remember that subtracting a negative number has two minuses which becomes a +).}$$

3.4 Challenges

The daily tasks for a newcomer in a corporate office are huge challenging task. We were eight members in a group total from Daffodil International University in BTCL. We were doing the same internship at the same company, so; the main challenge is currently I am facing; is keeping our internship reports unique from each other. If I

talk about the challenges, I faced in my internship program, the first one was, going internship for five days a week. The second problem was the work hour in this company. Workhour of this company was 9AM -3PM for us (Who is doing internship only for them). The overall behavior of the employees of the company was satisfactory. If there was a rating system, I would like to give a 8 out of 10. Behind, I was a little uncomfortable because everyone was busy with their work but at the same time I got used to the situation.

CHAPTER 4

Competencies and Smart Plan

4.1 Competencies Earned

Through my internship program, I have acquired advanced knowledge of computer fundamentals and security-related topics. My knowledge of routers, switches, hubs, etc. was very limited, so gaining first-hand experience using the equipment in their organization, Bangladesh Telecommunications Company Limited (BTCL). The organization gave it to me. As a participant in BTCL's internship program, I was able to improve my technical skills by applying software and upgrading hardware such as CPU, RAM, motherboards, drives, power supplies, and BIOS systems. I never got to experience all of this in my real life. I never got the chance to experience all this in real life. So this internship helped me open up to real involvement on a corporate level. Now you know how to create a fiber optic connection, how to create an ADSL connection, and how to troubleshoot software issues on Windows or Linux. Proper use of memory. A method of regularly installing programs on hardware. There are many things a corporate office with a remote PC can support. Proper use of memory. A method of regularly installing programs on hardware.

4.2 Smart Plan

My temporary position at Bangladesh Telecommunications Company Limited allowed me to improve my logical skills. Scientific skills include the ability to use good thinking in investigating a subject and the ability to deal with problems. He also admits to having improved insight by dealing with various system administration and major PC issues and checking the execution of functions. My interpersonal skills were strengthened when I found the opportunity to work with people from various foundations in a suitable environment. I improved my interpersonal skills by communicating with my superiors and senior employees. I found a way to talk to my boss and senior chief.

4.3 Reflections

The internship gave me my first taste of professional life and, most of all, strengthened my skills. My positive attitude, a strong sense of responsibility, ingenuity, resourcefulness and open-mindedness have allowed me to adapt to changing situations. It inspired me to keep learning throughout my life. My team members deserve a special thank you for everything they have done for me. Thank you very much for your cooperation and kindness. They spent a lot of time with me explaining how the IT system works. I could always get help from them for any professional matter. The work environment was new to me, and my colleagues gave me a better understanding of professionalism. This includes punctuality, greeting older people politely, smiling, and remaining calm when upset or angry.

CHAPTER 5

Conclusion and Future Career

5.1 Discussion and Conclusion

Bangladesh Telecommunications Company Limited (BTCL) gives the best telecommunication service among all the telecommunication companies in Bangladesh. To ensure that our customers are satisfied, understand their needs, and have an open mind, we work with them to provide a one-stop electronic communications organization that is agile, financially perceptive, and adaptable. During my time at BTCL, I worked with the Service group, PSTN Group and my group from Daffodil International University. Various discoveries and examinations have been made so far, and the company has a chance to change itself. Through this study, we gathered primary data on how change and turnover are handled, how the federation structure works, and the importance of the IT organization at BTCL. After reading this report, I gained a broader understanding of the company's culture, which will help me in my future endeavors.

Finally, it was a rough process to manage the opportunity to be able to do an internship at BTCL. However, the total journey was adventure.

5.2 Scope for Further Career

Unfortunately, BTCL is a public limited company. Anyone cannot start their career in BTCL that easily. There is a process for job placement in this company. Everyone has to go through it.

The significant part is, that the knowledge I gained from this company pushed me one step closer to my dream career. Now I can join a company efficiently and be a part of my country's valuable resource.

Appendices

APPENDIX A: Internship Reflection

Entry-level positions can be beneficial for students themselves as they provide the freedom to explore what it is like to work in a particular organization or industry. There are several. An example of efficient use of time is testing. Whatever your topic, you will find the best information from Temping. Temporary jobs are a great way for prospects to gain insight into a particular area or industry. In contributing to these undertakings, I also learned how to manage and adapt large-scale activities, supervise everything effectively, and keep up with project flows and schedules. I learned some new gadgets and advancements for working in a group environment through my temporary job. Towards the end of our temporary entry position, we found a way to do expert assessments and monitor everything through the quantification of alternatives.

Appendix B: Company Detail



Bangladesh Telecommunications Company Limited (BTCL)

37/E, Telejogajog Bhaban, Eskaton Garden, Dhaka

Telephone: +880 2 48311500

www.btcl.gov.bd/

Reference:

Websites:

- [1] BTCL history,online available at “https://en.wikipedia.org/wiki/Bangladesh_Telecommunications_Company_Limited” Last accessed on 18 October -2022-5:10 PM
- [2] BTCL services,online available at “<http://www.btcl.gov.bd/>” Last accessed on 29October -2022-10:27 PM
- [3] Telephone,online available at “<https://en.wikipedia.org/wiki/Telephone>” Last accessed on 5November -2022-11:03 AM
- [4] GPON,online available at “<https://us.hitrontech.com/learn/what-is-gpon-and-how-does-it-work/>” Last accessed on 8November -2022-10:49 PM
- [5] Colocation (colo), online available at “<https://www.techtarget.com/searchdatacenter/definition/colocation-colo>”Last accessed on 13November -2022-09:45 AM
- [6] Domain & Hosting, online available at “<https://www.hostinger.com/tutorials/domain-vs-hosting>” Last accessed on 13November -2022-07:10 PM
- [7] PSTN,online available at “<https://www.pngegg.com/en/search?q=old+Telephone>” Last accessed on 15November -2022-11:00 PM
- [8] ADSL,online available at “<https://www.techtarget.com/searchnetworking/definition/ADSL>”Last accessed on 17 November -2022-10:30 PM
- [9] ADSL,online available at “<https://www.pctechguide.com/digital-communication/an-overview-of-adsl-what-it-is-and-how-it-works>”Last accessed on 17November -2022-11:50 PM
- [10] GPON,online available at “<https://www.stl.tech/blog/everything-about-gpon-gigabit-passive-optical-network/>” Last accessed on 22November -2022-09:07 AM
- [11] Powermeasurement of optical fiber;online available at “<https://www.thefoa.org/tech/ref/testing/test/dB.html>” Last accessed on 26November -2022-07:45 PM
- [12] SWOT analysis of BTCL,online available at “http://dspace.ewubd.edu:8080/bitstream/handle/123456789/979/Munshi_Abdullah_Al_Mamun.pdf?sequence=1&isAllowed=y” Last accessed on 28November -2022-11:27 PM
- [10] BTCL logo,online available at “<http://www.btcl.gov.bd/assets/images/logo/btcl.jpg>” last accessed on 10 January-2023 10:10PM
- [11] BTCL logo,online available at “<http://www.btcl.gov.bd/images/logo/btcl.jpg>” last accessed on 10 January-2023 10:30PM
- [12] Old telephone,online available at “<https://m.media-amazon.com/images/I/61X0LB6dtZL.jpg>” last accessed on 10 January-2023 10:40PM
- [13] ADSL,online available at “<https://slideplayer.com/slide/13190336/>” last accessed on 11 January-2023 8:17AM

Fahri
 15-01-23

Turnitin Originality Report

Received on: 14-Sep-2023 13:54 WSA
 ID: 1992676343
 Word Count: 6045
 Submitted: 1

Similarity Index	Similarity by Source	
19%	Internet Sources	N/A
	Publications	N/A
	Student Papers	19%

INTERNSHIP REPORT ON COMPUTER NETWORKS (NETWORK ENGINEERING-BTCL) By Tofayel Bepari(201-15-13621)

4% match (student papers from 23-Nov-2022)
 Submitted to The Scientific & Technological Research Council of Turkey (TUBITAK) on 2022-11-23

3% match (student papers from 02-Apr-2019)
 Submitted to Daffodil International University on 2019-04-02

1% match (student papers from 26-Aug-2022)
 Submitted to Daffodil International University on 2022-08-26

1% match (student papers from 12-Aug-2022)
 Submitted to Daffodil International University on 2022-08-12

1% match (student papers from 22-May-2019)
 Submitted to Daffodil International University on 2019-05-22

1% match (student papers from 22-May-2019)
 Submitted to Daffodil International University on 2019-05-22

1% match (student papers from 08-Jul-2020)
 Class: Fall 2020 - Fall 2023
 Assignment: SI
 Paper ID: 1354842998

1% match (student papers from 05-Apr-2018)
 Submitted to Daffodil International University on 2018-04-05

1% match (student papers from 12-Jul-2021)
 Submitted to University of Mauritius on 2021-07-12

1% match (student papers from 08-May-2022)
 Submitted to Ahsanullah University of Science and Technology on 2022-05-08

1% match (student papers from 03-Sep-2021)
 Submitted to Techkatho on 2021-09-03

< 1% match (student papers from 02-Apr-2019)
 Submitted to Daffodil International University on 2019-04-02

< 1% match (student papers from 28-Mar-2022)
 Submitted to Daffodil International University on 2022-03-28

< 1% match (student papers from 23-Feb-2022)
 Submitted to Daffodil International University on 2022-02-23

< 1% match (student papers from 28-Nov-2022)
 Submitted to Daffodil International University on 2022-11-28

< 1% match (student papers from 30-Jun-2020)
 Class: Fall 2020 - Fall 2023
 Assignment: SI
 Paper ID: 1351779933

< 1% match (student papers from 27-Mar-2022)
 Submitted to Daffodil International University on 2022-03-27

< 1% match (student papers from 19-Aug-2022)
 Submitted to Daffodil International University on 2022-08-19

< 1% match (student papers from 01-Apr-2019)
 Submitted to Daffodil International University on 2019-04-01

< 1% match (student papers from 09-May-2022)
 Submitted to National College of Ireland on 2022-05-09

< 1% match (student papers from 02-Jun-2020)
 Submitted to University of Wales Swansea on 2020-06-02

< 1% match (student papers from 15-Apr-2022)
 Submitted to College of Science and Technology, Bhutan on 2022-04-15

< 1% match (student papers from 18-Dec-2022)
 Submitted to The Open University of Hong Kong on 2022-12-18

< 1% match (student papers from 20-May-2022)
 Submitted to Curtin University of Technology on 2022-05-20

< 1% match (student papers from 14-May-2022)
 Submitted to Bickfords Asia College on 2022-05-14

< 1% match (student papers from 17-Aug-2015)
 Submitted to Central Queensland University on 2015-08-17

< 1% match (student papers from 29-Jun-2019)
 Submitted to Edith Cowan University on 2019-06-29

< 1% match (student papers from 03-Jan-2019)