INTERNSHIP ON TELECOMMUNICATION & COMPUTER NETWORKING

BY

UMMA TAMANNA

ID: 201-15-13861

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

Supervised By

Md. Sazzadur Ahamed
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised by
Nishat Sultana
Lecturer
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

JANUARY 2023

APPROVAL

This internship titled **"Telecommunication Network in Bangladesh Telecommunications Company Limited (BTCL)"**, submitted by **Umma Tamanna**, and **ID No: 201-15-13861** 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   **Chairman**
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Narayan Ranjan Chakraborty   **Internal Examiner**
Associate Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Raja Tariqul Hasan Tusher   **Internal Examiner**
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Md. Safaet Hossain   **External Examiner**
Associate Professor & Head
Department of Computer Science and Engineering
City University

DECLARATION

It is hereby announced that the work described in this internship report was carried out by me under the supervision of **Md. Sazzadur Ahamed, Assistant Professor**, Department of Computer Science and Engineering, Daffodil International University to partially meet the requirements for Bachelor's degree. Computer science and engineering science. I hereby certify that this content is my original creative work. I certify that no portion of this essay or any portion of it has ever been submitted elsewhere with the intention of earning a degree.
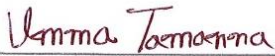
Supervised by:

Md. Sazzadur Ahamed
Assistant Professor
Department of CSE
Daffodil International University

Co-Supervised by:

Ms. Nishat Sultana
Lecturer
Department of CSE
Daffodil International University

Submitted by:

Umma Tamanna
ID: 201-15-13861
Department of CSE
Daffodil International University

ACKNOWLEDGEMENT

The first thing I want to do is thank **Md. Sazzadur Ahamed, Assistant Professor** in the department of computer science and engineering at Daffodil International University in Dhaka, from the bottom of my heart for her unflinching advice. This work has a solid foundation thanks to her understanding, motivation, and guidance throughout the internship and report writing process. Her contributions to the creation of the ideas in this study have been extremely helpful in completing this endeavor. I also want to express my gratitude to everyone else who, whether directly or indirectly, assisted and encouraged me throughout my internship. I appreciate the opportunity to intern at the switch room management center provided by Bangladesh Telecommunications Company Limited (BTCL). In addition to providing me with the essential data, information, procedures, and management processes, as well as expanding on several ideas, many nice people assisted me in writing the report. during my internship, whether formally or informally, helped and inspired me. I also want to thank the CSE teachers and staff at Daffodil International University, particularly **Dr. Touhid Bhuiyan**, Head of the Department of CSE, for helping me complete my internship. I want to express my gratitude to my parents in especially for their encouragement and support throughout my life and professional career.

Finally, I would want to express my sincere gratitude to Allah, The Merciful, The Exalted.

ABSTRACT

In addition to being a phone carrier and CC domain registrant, BTCL also manages the IGW, IIG, ICX, ISP, NGN, and PSTN (.BD). BTCL owns and operates the majority of the copper, fiber optic, and microwave networks in the country. The Post and Telegraph Division of BTCL was established in 1853. All of BTCL is currently owned by the government. One of the most important services provided by BTCL is landline phone service. There are a number of services available, including dial-up, high-bandwidth local and international leased lines, VPN, MPLS, and country domains (.bd). NGN will soon provide soft switch services and triple play on fiber at home. I wrote this article following a four-month internship at Bangladesh Telecommunications Company Limited. I was able to learn more about a telecoms company's everyday operations thanks to this internship program. The focus of this article is firmly on my personal views and academic knowledge.

TABLE OF CONTENTS

CONTENTS

PAGE

LIST OF FIGURES

LIST OF TABLE

TABLE   **PAGE NO**

CHAPTER 01

INTRODUCTION

1.1 Introduction

Analogue or digital information can be sent between different places using telecommunication networks, which use electromagnetic or optical signals as their means of transmission. Audio and video data as well as other types of information are all possible. Wireless or wired infrastructures support the networks. Telecommunication networks include, but are not limited to, the internet, cable TV networks, mobile networks, and telephone landline networks.

In Bangladesh, BTCL is by far the biggest telecom company. A public limited company that the government owns.

All around the nation, it has numerous branches. In the local area, BTCL offers phone and internet service. Since I am really interested in communications and want to learn as much as possible about it, I chose BTCL for my internship. BTCL is the best in terms of communications.

1.2 Motivation

The electrical transmission of data across great distances is referred to as telecommunications. Information can be sent using voice conversations, data, text, photos, and video, among other methods. Telecommunications networks are created by connecting more or less far-flung computer systems together. And, A collection of interconnected computing devices that may share resources and exchange data is referred to as computer networking. To transport data across physical or wireless technologies, these networked devices use a set of rules called communications protocols.

As a student studying computer science, I'm quite interested in the telecoms and networking industry. For the following reasons, I selected BTCL for my internship:

A well-known government-owned telecommunications firm is BTCL.

Both telecommunications and internet services are offered by BTCL.

After all is said and done, I want to intern at BTCL. so that I can educate myself on the critical concepts in networking and telecommunications.

I will be able to significantly contribute to the creation of a "Digital Bangladesh" by studying vital information about telecommunication and computer networking.

1.3 Objective

The main goals of this report are to demonstrate the knowledge and information gained throughout the organization's internship time and to meet the standards of the CSE program.

- I am able to learn about networking and telecommunications.
- I'd also like to learn more about growing networks, networking security, and other subjects.
- I'm interested in learning about all of the telecommunications company's services.
- Understand the benefits of IGW&ICX, domains, hosting, and other services.
- know about telecommunications data transmission.
- Understanding network topology
- Getting your first employment experience will give you a competitive edge on the job market.
- In addition to my technical knowledge, I should familiarize myself with the corporate culture of the telecommunications company.
- Learn about the working practices and official culture of telecommunications companies.

1.4 Introduction to the company

■ BTCL is the abbreviation for Bangladesh Telecommunication Company Limited.

■ It was incorporated in accordance with the Companies Act of 1994.

■ Government ownership of a public limited firm.

■ Members of the Board of Directors are often appointed from among government officials and members of professional organizations.

■ The ability for the government to transfer a sizable portion of BTCL's stake to the general public is reserved.

■ In urban areas, BTCL offers both internet and telephone service.

■ BTCL employs roughly 13,000 people and has a net worth of Rs 15,000 crore.

■ In Bangladesh, BTCL is a reputable government-owned telecommunications company.

■ It manages long distance calls as well as telephone and internet services.

1.5   Success of internship

Internships are advantageous for both the company and the intern. By incorporating it with regular education, an intern can acquire real-world skills, and an employer can hire people for little or no money. There are, however, some additional benefits:

■ An internship gives a student their first professional experience.

■ Internships help an intern advance their career by giving them the opportunity to get fundamental work experience.

■ Students can obtain experience in the working world through internships.

■ While on an internship, a student might learn from his mistakes.

■ The proper career path can be chosen with the help of internships.

■ Throughout his internship, an intern may run into a variety of people, which may broaden his social circle.

1.6 Report Layout

The following chapters make up this report's organizational structure:

Chapter-1: Introduction, Motivation, Objective, Introduction to the company, Success of internship, Report layout.

Chapter-2: Organization Introduction, History, Services of Company, SWOT Analysis, Organizational Structure.

Chapter-3: The basic concepts of Telecommunication, Telecommunication Network, Folded Network, Fundamentals of Out side plant & MDF.

Chapter-4: IP Multimedia Subsystem, IMS Logical Function NE, Other Logic
Function NEs in IMS.

Chapter-5: Internet related Licenses of BTCL, Data & Internet Related Services of BTCL, Broadband services of BTCL, Motivations for G-PON.

Chapter-6: Activities and Daily Tasks.

CHAPTER 2

ORGANIZATIONS

2.1 Introduction

The major telecommunications provider in Bangladesh is BTCL, a publicly traded business that is owned by the government. Previously, it went under the name Bangladesh Telegraph and Telephone Board (BTTB). It changed its name to Bangladesh Telecommunication Company Limited in 2008 (BTCL). It received recognition as a publicly traded, government-owned company on July 1, 2008. BTCL employs roughly 13,000 people and has a net worth of Rs 15,000 crore.

BTCL typically offers internet and phone connection services. It manages long distance calls as well as telephone and internet services.

Figure 2.1: BTCL logo

2.2 History

In 1853, British India established the Posts and Telegraph Department. In 1885, the Telegraph Act of 1885 was passed. In 1933, the Wireless Act of 1933 was passed. 1962 saw a name change for the Pakistan Telegraph and Telephone Department. In 1971, Bangladesh Telegraph & Telephone Department under Ministry changed its name to Bangladesh Telegraph & Telephone Department. Department of Posts and Telecommunications The 1975 Telegraph and Telephone Board Ordinance was chosen to be passed.

Established in 1979, the Bangladesh Telegraph and Telephone Board (BTTB) is charged with granting telecommunications and wireless service licenses. Telecommunications policy in 1998. Bangladesh Telecommunications Company Limited (BTTB) formally began operations on July 1, 2008. Every single BTCL share is owned by the Bangladeshi government.

Shares will eventually be offered for public purchase. 2009 The Bangladesh Telecom and Telephone Board (Amendment) Act, 2009 is a law that modifies the Bangladesh Telecom and Telephone Board.
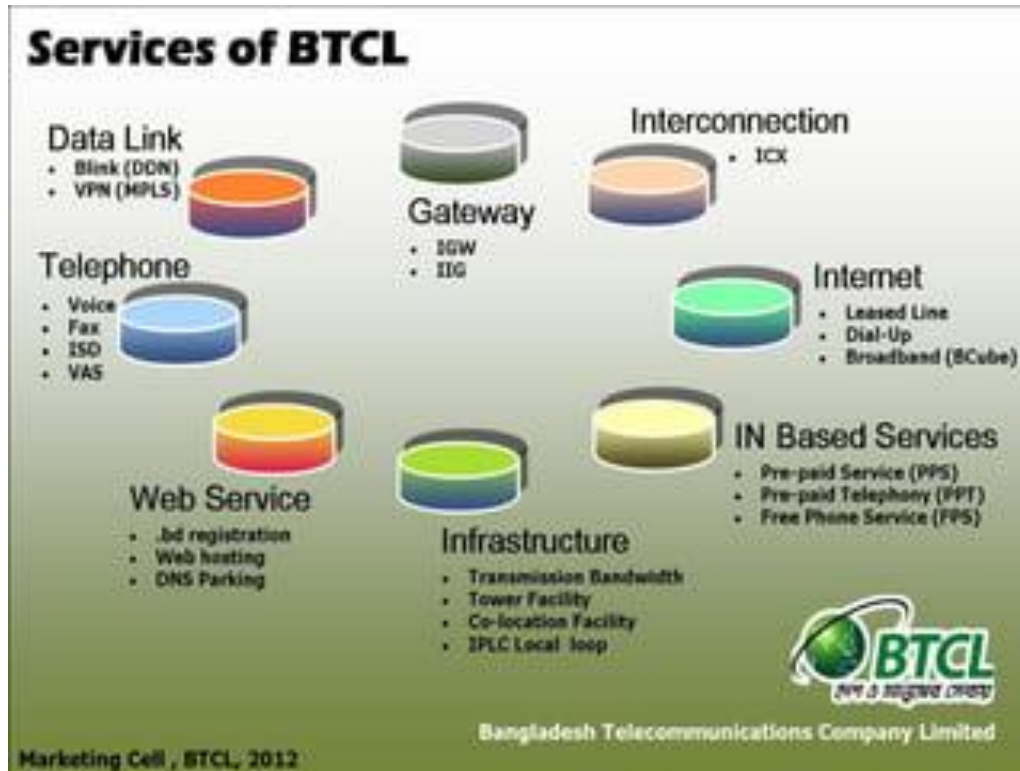
2.3 Services of Company

Figure: 2.2: BTCL's Service

1. Data Link

2. Telephone

3. Web Service

4. Domain & Hosting

5. Gateway

6. Internet

2.3.1 Structure of Telecommunications
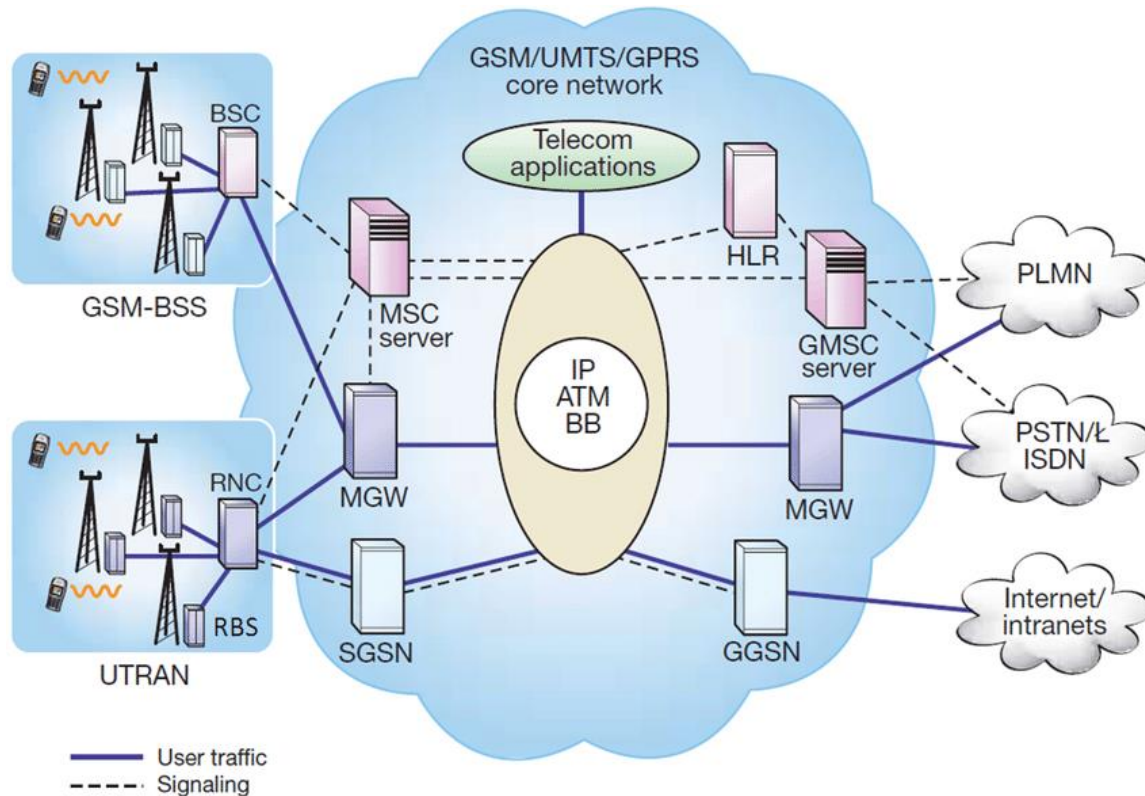
Figure:2.3: Bangladesh's telecommunications network's topology

In accordance with the National Telecommunications Policy of 1998 and the International Long Distance Telecommunications Services (ILDTS) Policy of 2007, all mobile operators must interconnect via Interconnection Exchange (ICX), and all international calls must be handled by a Ban International Gateway (IGW) that is connected to both mobile and fixed operators via ICXs.

The Interconnection Exchange (ICX) will accept and transfer calls made from mobile or fixed operators to other networks, depending on whether the call is local or international,

to the destination network or to the IGWs. In addition, ICX will route calls from IGWs to the correct recipient.

2.3.2 Internet Service

BTCL is the most extensively available Internet service provider in the country, offering dial-up Internet connection in all 64 districts. It had 32,433 dial-up subscribers as of January 2009. In an effort to boost customer satisfaction, BTCL has been improving its dial-up Internet service since the start of 2007. It also takes care of. Under the BCUBE brand, BTCL offers consumer-grade broadband Internet services. In order to deliver the service, ADSL2+ technology is used. EMEM Systems Ltd, System & Services Ltd (SSL), and Sis View Technologies Ltd. now handle BTCL's BCUBE sales and customer support operations. BTCL currently provides service to 15,000 clients. This service brings in roughly $19,000,000 each month for BTCL.

In order to continue offering its clients better services without interruption, officials claim that the state-owned telecoms company will shortly begin construction on a countrywide broadband wireless access network with assistance from Korea. To create the new network, Bangladesh Telecommunications Company Limited (BTCL) and the Korean Economic Development Cooperation Fund will collaborate (EDCF).

2.3.3 Satellites

There would be 40 transponders for broadcasting and communication on Bangladesh's first satellite.

The satellite is now being designed, and Space Partnership International (SPI), a US-based company with a contract with the government, will assist with its launch.

Bangladesh Telecommunications Company Limited will construct the two ground stations required to run the satellite in Joydebpur, Gazipur, and Betbunia, Rangamati (BTCL). The satellite will be sent into orbit by June 2017 in memory of Bangabandhu Sheikh Mujibur Rahman, the Father of the Nation.

2.4 SWOT Analysis

In my internship, I look for the Fortes Weaknesses.

Organization

- Bangladesh's largest telecommunications company.
- This government-owned telecommunications company has the backing of the Bangladeshi government at all times.
- Provide internet and telephone lines to homes, businesses, government agencies, and private offices, among other services.
- It has numerous locations across the nation.
- Taking care of a lot of employees and equipment.
- Employees are dedicated to the company and have high levels of skill.

Weaknesses:

- There are not enough employees.
- The wage structure is inadequate, and the employees lack motivation.
- Marketing is poor in relation to the private sector.
- Insufficient Hardware.
- A lack of adequate training for the workforce.

Opportunities:

- Increase the workflow's level of automation.
- Internet services. Telephone services.
- Fast Data Transfer.
- The internet is pretty quick.
- Reasonably priced phone and internet services.

Threats:

- Hackers make an assault.
- Customers can occasionally be dishonest.
- Inadequate service.

\
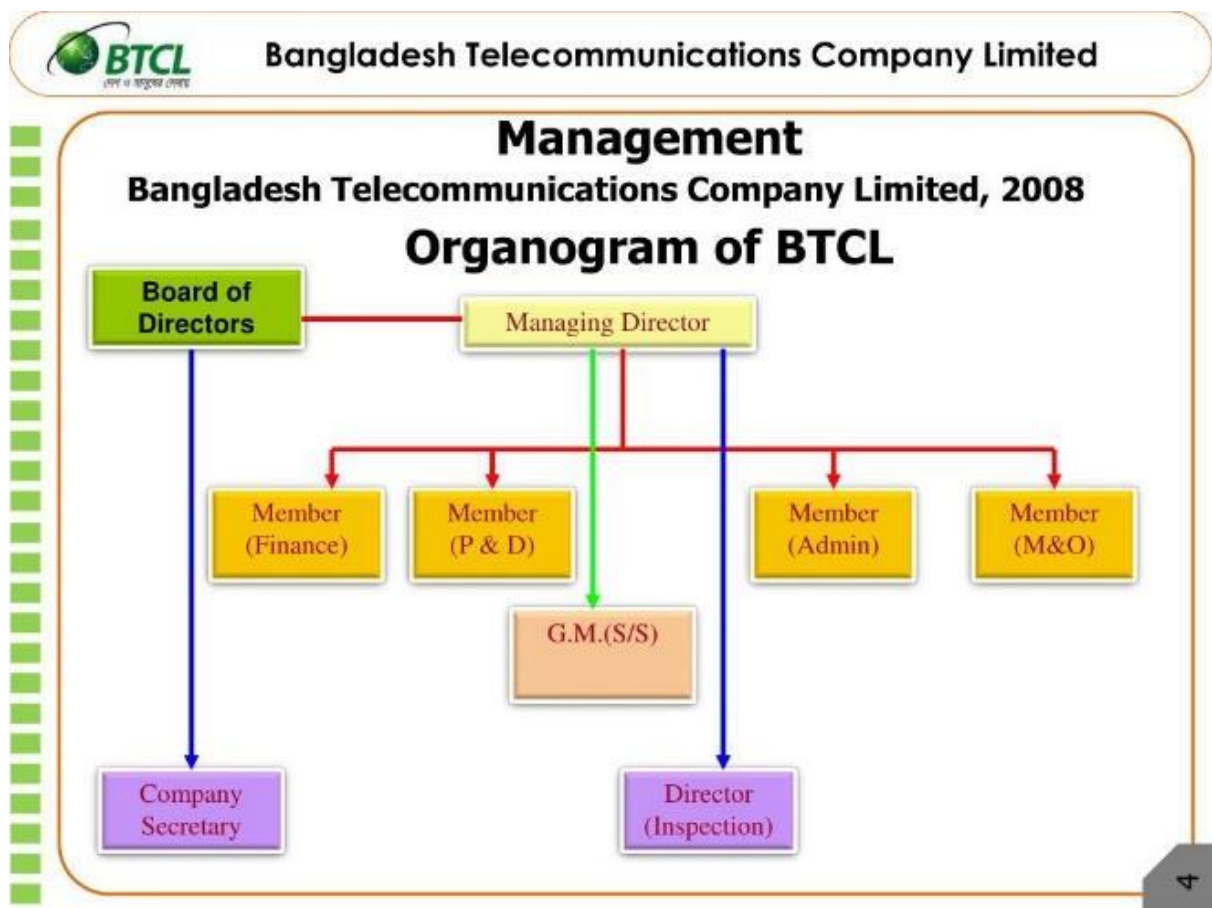
2.5 Organizational Structure

Figure: 2.4: Organogram of BTCL

CHAPTER 03

THE BASIC CONCEPTS OF TELECOMMUNICATION

3.1 Basic of Telecommunication Switching

- Bell Compay formed in 9th July, 1877

- No patent

- Challenge to control the market

- Merger and acquisition of companies

- AT&T control all interconnection network

- Kingsbury Commitment 1913

- Ring-down circuit, Basic Four-phone network

- Centralized Operator: The human switch

- Analog signaling: Ideal for human interaction

- Digital Signaling: NyQuil theorem, PCM (repeater

- used), 64K

- Local loop, Trunk, Inters witch communication

- User-to-network comm.: In-band (DTMF), Out-of-

- band (BRI)

3.1.1 Telecommunication service specific networks

- Telegraph network

- Telex network

- Telephone network

- Data network.

3.1.2 Switching System Elements
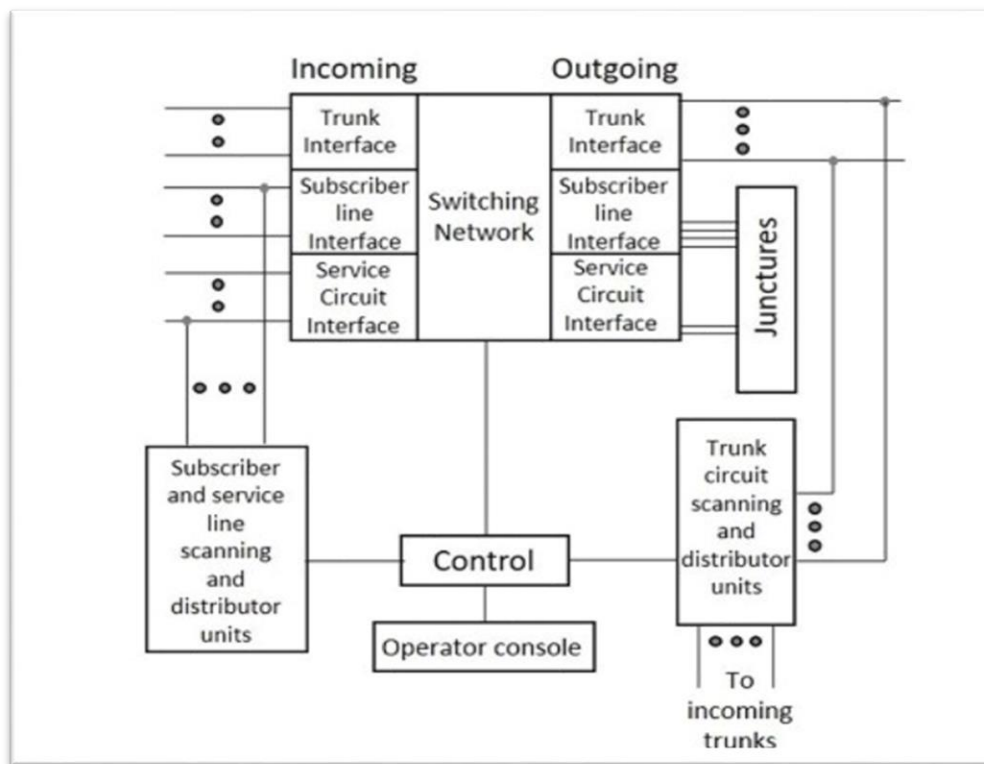
Figure: 3.1: Switching System Elements

Switching Network

Between the called subscribers and the calling subscribers, it offers switching paths.

Control Subsystem

It detects the inlet and outlet lines and decodes the signaling data transmitted over these lines to actively build the switching channels, making it a crucial part of the switching system.

This control subsystem oversees the flow of signals down the lines and controls the creation and severance of connections. The control sub system sends signaling information to the subscriber and other exchanges linked to the outbound trunks.

Signaling

The signaling formats and requirements for subscribers, trunks, and subsystems range significantly. A switching system therefore provides three distinct sorts of signaling:

- Signaling in the subscriber loop
- Signaling between exchanges
- Register or intraexchange signaling

Components with switching, control, and signaling capabilities make form a switching system.

Interface for Trunk

his port serves as the trunk line's termination point between switching systems. Where the trunk lines are attached to the system is called the trunk interface.

Subscriber Line Interface

It is at this port that the subscriber lines that connect subscribers to switching systems come to an end. The subscriber line interface is the location of the system's connection to the subscriber lines.

Unit for Line Scanning

Unit for Line Scanning tool detects the associated lines and collects the indication information with them. The control subsystem uses the data obtained from these lines to determine outlets and inlets.

3.2 Telecommunication Network

From the start of the 20th century (1900–1980), whenever a long distance call was placed, the operator at the nearest switching center received the call first and noted the location and subscriber's number. In this instance, It was the operator's responsibility to call the distant switching center, make the connection, and then dial the original subscriber back. The Trunk call system was the name of this call-making system.

3.2.1 Basics of Switching system

- Inlets and Outlets
- Switching Matrix

3.3 Folded Network
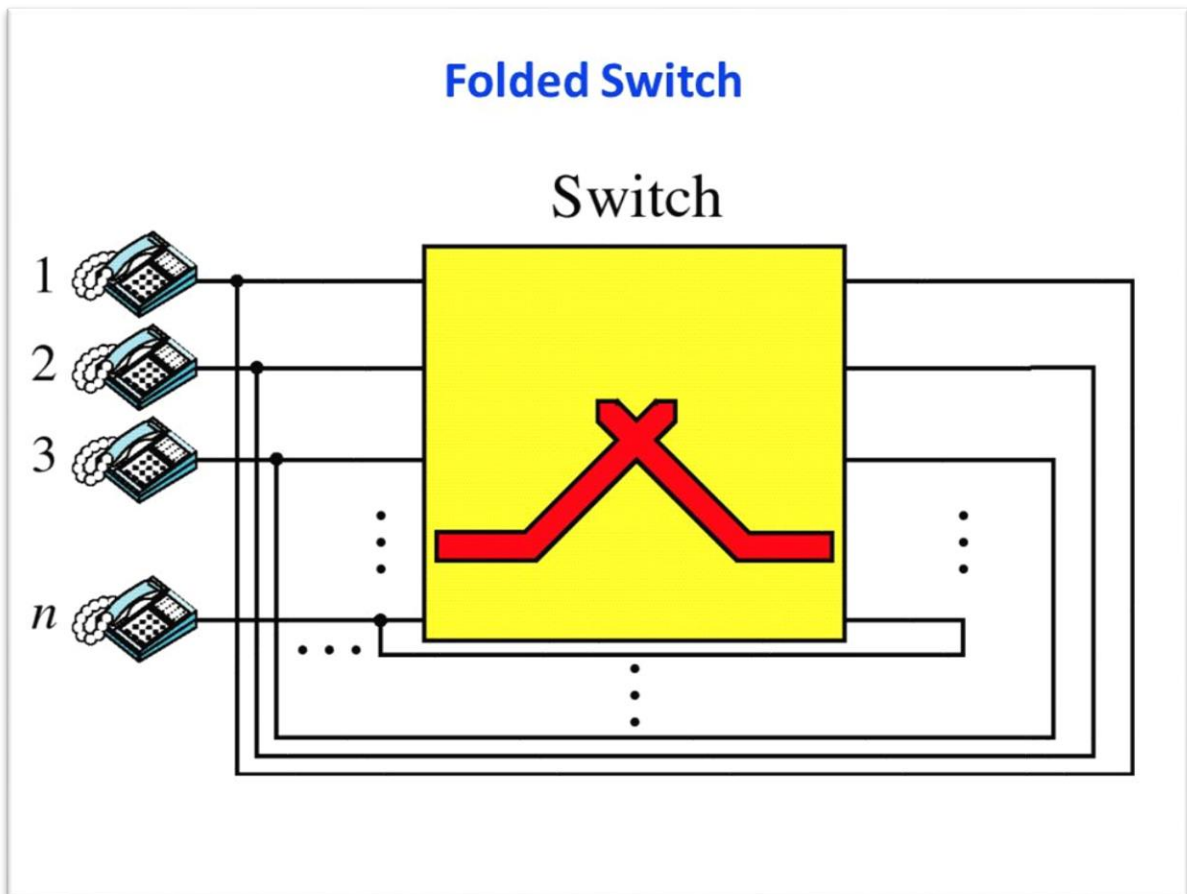
Figure: 3.2: Folded Network

A switching network is referred to as a symmetric network, which means N=M, when the number of outlets and inlets is equal. The term "folded network" refers to a network where the outlets and inlets are interconnected.

N inlets that act as outlets in a folded network are folded back to the inlets. The switching network, however, offers connections to the inlets and outlets as required.

3.4 Fundamentals of Out side plant & MDF

Figure: 3.3: Fundamentals of Out side plant & MDF

A Main Distribution Frame (MDF) is a telephony name for a signal distribution frame or cable rack that links and organizes telecommunication wiring from the telephone network it supports, as well as any number of intermediary distribution frames.

A communications facility's internal equipment is connected to cables and subscriber carrier equipment through the MDF. Each cable used to service user telephone lines is supplied to the local exchange equipment by an MDF when it has arrived.

Cable Chamber

Cabinet

LSA

DP: 10, 20, 40 pairs, etc..

Cables: Primary, Secondary

Cable pairs: 10, 20, 50, 70, 100, 200 pairs ..etc.

Cable joints

Figure: 3.4: Cable Chamber

CHAPTER 4

DESIGN OF IMS NETWORK

4.1 IMS：IP Multimedia Subsystem

IMS （IP Multimedia Subsystem-IMS),introduced at R5 phase by 3GPP, relays on the PS domain. IMS provides mobile users with muli-media services based on full-IP network.
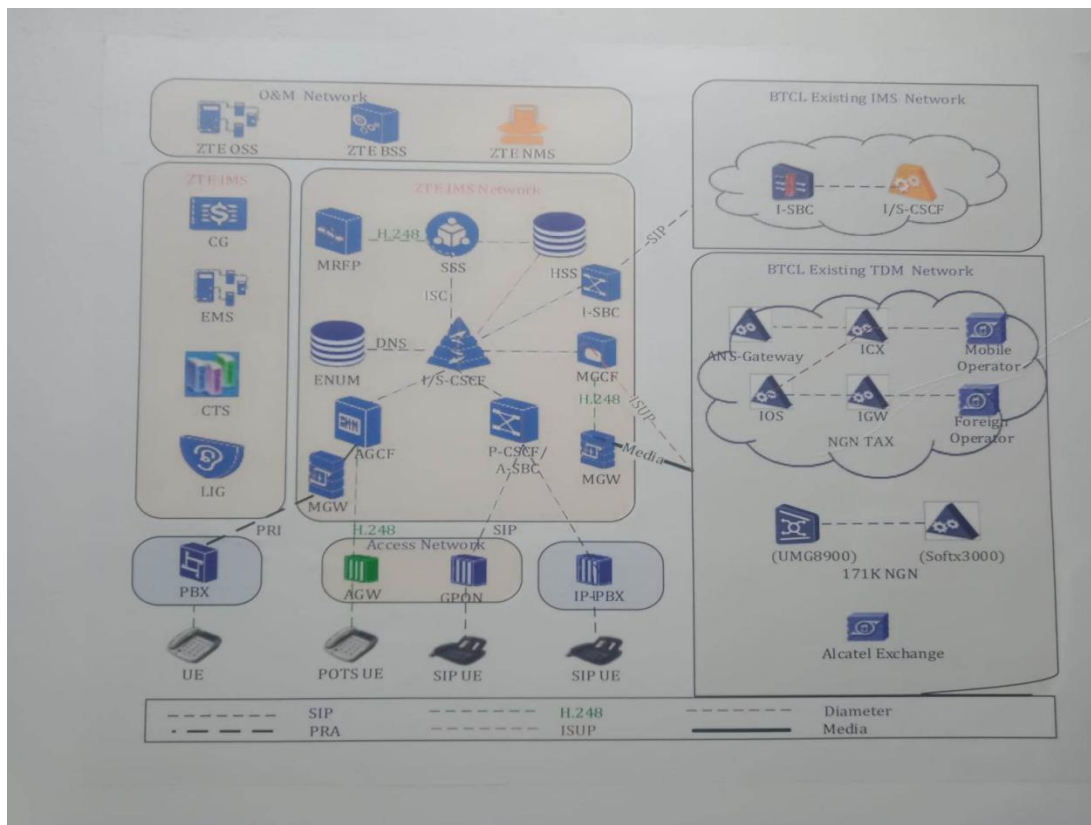

Figure:4.1 IP Multimedia Subsystem

4.1.1 IP

- IP-based transmission
- IP-based session control
- IP-based service implementation

4.1.2 Multimedia

■ Combination of voice, video, image and text, etc

■ Support multiple access approaches, varied access

■ approaches and terminals with varied capacities.

4.1.3 Subsystem

Rely on existing network technique and devices, reuse the existing network system to the largest extent.

Wireless network regards PS/GPRS network as the bearer network.

Fixed network regards the IP system based on fixed access as the bearer network.

4.2 Logical IMS Entity Classification

a. Session Control and Route

b. Data Management Authentication

c. Media Resource（MRF）

d. Service Control

e. Inter-working Function

4.3 IMS Logical Function NE

4.3.1 Proxy (P)-CSCF：

■ First connection point from UE to the network

■ Establish security alliance between P-SCSCF and terminal

■ SIP header compression

■ Bearer, control binding and enable/disable of QoS resource

4.3.2 Interrogating (I)-CSCF：

■ External contact point of the IMS system

■ THIG function is to hide interior topological information of   the IMS network

■ S-CSCF distribution function

■ Positioning function of called S-CSCF

4.3.3 Serving (S)-CSCF：

■ User's Registrar: responsible for user's registration
■ Responsible for user's authentication and authorization
■ Responsible for service control and triggering, and interact   with the service layer

4.4 Other Logic Function NEs in IMS

4.4.1 SBC: Session Border Control

It is situated near the IMS core network's edge. It is in charge of dividing the access network from the IMS core network as a signaling proxy and a media proxy of the IMS network. Through SBC, NAT traversal, firewall traversal, QoS control, and network security might be achieved between public and private networks.

4.4.2 DNS、ENUM Server

DNS (Domain Name System): The server is in charge of analyzing URL and IP addresses by enlisting the assistance of an external DNS server or setting up an internal DNS server.

It is the responsibility of the ENUM (E.164 Number URI Mapping) server to convert phone numbers to URLs.

CHAPTER 05

ADSL & GPON SCENARIO IN

BTCL, ADSL & GPONE

5.1 BTCL's Internet-related Licenses

Nationwide Internet Service Provider: As an ISP, BTCL offers data and internet connections to clients in the public and private sectors.

International Internet Gateway (IIG): As a member of IIG

- To send internet traffic to Bangladesh, BTCL is connected to global upstream service providers including Sing tel, TATA, Equinox, Katmai, Google, and Facebook, among others.

- BTCL supplies other IIG or ISP providers with Internet bandwidth.

BTCL has NTTN (Nationwide Telecommunication Transmission Network) license.

5.2 Data & Internet Related Services of BTCL

- Leased Line Internet

- VPN

- Google Global Cache

- IP address

- NIX

- Domain

- ADSL internet

5.3 Broadband services of BTCL

■ ADSL (Asymmetric Digital Subscriber Line)

■ GPON (Gigabit Passive Optical Network)

5.4 ADSL introduction

An adaptation of DSL known as ADSL allows for quicker data transmission over copper telephone lines.

ADSL enables voice, video, and data and can deliver

5.4.1 ADSL standards

Table: 5.1: ADSL standards

Standard name	Common name	Downstream rate	Upstream rate
ITU G.992.1	ADSL (G.DMT)	8 Mbit/s	1.0 Mbit/s
ITU G.992.2	ADSL Lite (G.Lite)	1.5 Mbit/s	0.5 Mbit/s
ITU G.992.3/4	ADSL2	12 Mbit/s	1.0 Mbit/s
ITU G.992.3/4 Annex J	ADSL2	12 Mbit/s	3.5 Mbit/s
ITU G.992.3/4 Annex L	RE-ADSL2	5 Mbit/s	0.8 Mbit/s
ITU G.992.5	ADSL2+	24 Mbit/s	1.0 Mbit/s
ITU G.992.5 Annex L	RE-ADSL2+	24 Mbit/s	1.0 Mbit/s
ITU G.992.5 Annex M	ADSL2+	28 Mbit/s	3.5 Mbit/s

5.4.2 ADSL network components

■ The ADSL modem at the client's location

■ Access multiplexer for DSL (DSLAM)

■ Broadband Access Server (BAS)/ B-RAD

■ Sp-litter: An electrical low pass filter that divides ADSL data frequencies from analogue voice or ISDN signals..

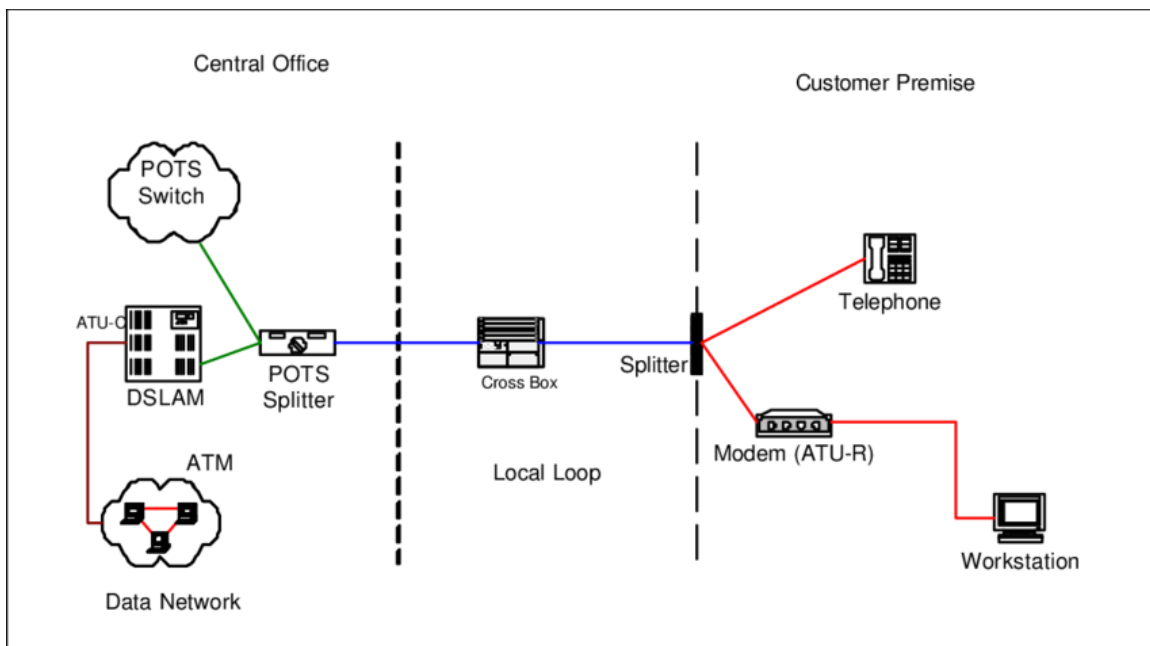## 5.4.3 ADSL Loop Architecture

Figure: 5.1: ADSL Loop Architecture

5.4.4 ADSL Loop Architecture

- Phone line, ADSL activated by your phone provider.

- Filter to differentiate the Internet signal from the phone signal.

- ADSL modem.

- Subscription with an ISP that accepts ADSL.

5.5 Motivations for G-PON

GEPON (Ethernet Passive Optical Network) is a cutting-edge optical access network technology that employs passive optical fiber transmission and point-to-multipoint architecture to offer a range of services over Ethernet. Another name for it is EPON.

5.5.1 GPON Principle

The Wavelength Division Multiplexing (WDM) technology used by PON makes it possible to communicate in both directions over a single fiber.
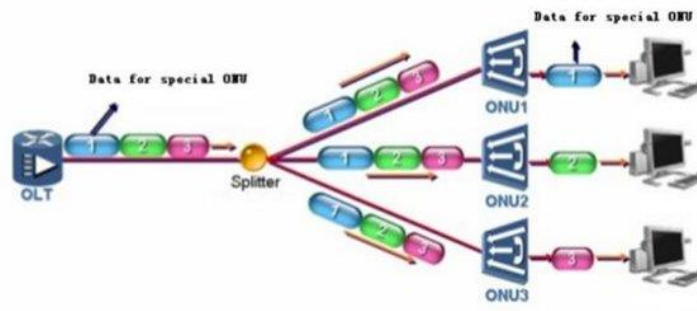

Figure: 5.2: GPON Principle

GPON uses two multiplexing methods to segregate the upstream and downstream signals of different users over a single fiber:

The transmission of data packets in the downstream direction is broadcast.

Data packets are transferred via TDMA in the upstream direction.

5.5.2 GPON Components

This GPON system is made up of four primary parts:

- Optical line terminal (OLT).

- Transmitting media (cabling and components).

- Fiber optical splitter.

- Optical network terminal (ONT).

CHAPTER 06

TASKS, PROJECTS AND ACTIVITIES

6.1 Activities and Daily Tasks

I worked in the outside plant and the switch room during my internship (OSP).

Daily Task in Switch Room

I would gather client applications for phone and internet lines, update them on BTCL's own Web portal, and assist customers with a variety of inquiries. This included allocating numbers to consumer preferences and creating user IDs. In this, my instructor has been of great assistance. I've attempted to solve a variety of issues that I've encountered at various points in time. I have completed a number of duties in the switch room in this manner.

Figure: 6.1: Working time in switch room

Figure: 6.2: Switch room

Figure: 6.3: MOTN

REFERENCES

[1] "Bangladesh Telecommunication Company Limited" <<https://www.btcl.gov.bd/ >>

(last accessed on 1 December 2022 at 10am).

[2] "Types of Telecommunication available at"

<<https://en.wikipedia.org/w/index.php?title=Bangladesh_Telecommunications_Company_Limited&oldid=1110679889/ >> (last accessed on 1 December 2022 at 7pm)

[3] "Details about the telephone, online available at"

<< https://en.wikipedia.org/wiki/Telephone >> (last accessed on 1 December 2022 at10pm)

[4] "Know more about GPON, online available at"
<<https://us.hitrontech.com/learn/what-is-gpon-and-how-does-it-work/ >> (last accessed on 2 December 2022 at 8am)

[5] "History BTCL" en.wikipedia.org. <<https://www.wikipedia.org/>>(last accessed 2

December 2022 at 6pm)

Umma_Tamanna_final_defense_report.docx

24% SIMILARITY INDEX	24% INTERNET SOURCES	9% PUBLICATIONS	% STUDENT PAPERS

PRIMARY SOURCES

1	dspace.daffodilvarsity.edu.bd:8080 Internet Source	17%
2	www.authorstream.com Internet Source	3%
3	www.tutorialspoint.com Internet Source	2%
4	en.wikipedia.org Internet Source	1%
5	www.ukessays.com Internet Source	1%
6	www.fs.com Internet Source	<1%
7	biography.omicsonline.org Internet Source	<1%
8	docplayer.es Internet Source	<1%
9	oa.upm.es Internet Source	<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		