INTERNSHIP IN TELECOMMUNICATION AND COMPUTER NETWORKING AT BTCL

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

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APPROVAL

This internship titled "**Internship in Telecommunication and Computer Networking at BTCL**", submitted by Md: Juboraz Morshed Khan, ID No: 201-15-13954 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.

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DECLARATION

We hereby declare that, this internship project report is done by us under the supervision of,

Mr. Abdus Sattar, Assistant Professor & Coordinator M.Sc, Daffodil International University, in partial fulfillment of the requirement for the degree of Bachelor of Science in Computer Science & Engineering. We are declaring that this report is our original work, we also declare that neither this report not any part thereof has been submitted elsewhere for the award of Diploma or any Degree.

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We are also indebted to **Mr. Abdus Sattar**, Assistant Professor & Coordinator M.Sc, Daffodil international University for their available comments in the project. We are deeply in indebted to **Kamalesh Biswas**, Director (Recruitment & Training) for give the opportunity to compete my internship on BTCL.

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Finally, we must acknowledge with due respect the constant support and patients of our parent.

ABSTRACT

This internship focuses on "BTCL working procedures." This is an example of telecommunication network experience. We wanted to intern at Basic Telecommunication Company Ltd. (BTCL). Because communication is now the talk of the globe. This guide attempts to summarize what we learned about real-world field installation and operating operations of telecommunication networking on BTCL during our internship. BTCL is responsible for providing basic telecommunications services all over the country. Working on BTCL was a fantastic opportunity for us. This firm supplied phone services across Bangladesh. The majority of users may also access the internet using dial-up. This corporation boasts the greatest telecom infrastructure, which includes copper cables, microwave linkages, satellite links, and an optical fiber network, among other things. ADSL This firm provides broadband internet services. We learned about high bandwidth, internet, ADSL, IGW, IIG, ICX, ISP, NTTN, PSTN solutions, MDF, and switch rooms.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Network is no more a foreign concept. Computer networking has been around for a long time, and as technology has advanced, it has grown quicker and less expensive. Networks are composed of many equipment such as computers, switches, and routers that are linked together by cable or wireless signals. At modern day, all companies, industries, and homes have several computers and mobile devices that need to speak with one another in order to share data, which is why they are linked to the internet. The number of internet users is increasing rapidly. As a result, we must consider the internet. Internet Create new employment from home.

1.2: Motivation

The Internet is the most essential item in the age of information technology. BTCL is utilizing several Internet services as like (Telephone, Broadband, Gateway, web service etc). I discovered that BTCL has a strong reputation for user satisfaction and service. In Bangladesh, BTCL is a well-known IIG, ISP, and ICX service provider. The internship experience at BTCL will provide me with insight into my life and future and will be a more rigorous step in my future studies and career. From there, my ultimate hope will be realized. Overall, I intend to put my degree to good use.

1.3: Internship Objectives

Internship to gain hands-on knowledge of the field of computer engineering. It is critical that we use our theoretical skills in the field to gain professional experience in the engineering job market. Following the organization's norms and regulations during my internship term has helped me become more professional. This is why I decided to work as an intern in my future career. I'm hoping that my internship skills will keep me ahead of the competitors in today's employment market. To gain experience in Telecommunication.

- Raising awareness of the initiative.

- To comprehend the current state of networking in practical domains.

- Pay attention to organizational and interpersonal dynamics.

- To become acquainted with the official atmosphere and attitude.

- Research on Copper Cable Operation and Maintenance in BTCL

- BTCL is conducting research on submarine cables.

- Research into the maintenance and operation on optical fiber in BTCL.

- Research into the installation and use of GPON technologies in BTCL.

- In this case, the term "install" refers to the process of installing a program on a computer.

1.4: Introduction of Company

Bangladesh Telecommunications Co. Ltd. is a communication carrier, IIG, IGW, ISP, NTTN, PSTN Operator and cc domain (.bd) registrar. Copper, optical fiber, and microwave networks are available practically everywhere in the country. BTCL began as the Post and Telegraph Department in 1853.

Bangladesh Telecommunication Company Limited (BTCL) is currently wholly controlled by the government. Land line telephone, dial-up connection, bandwidth efficiency local and global framework which provides, VPN, MPLS, country domain (.bd), co-location, and other services are available. NGN soft switch, G phone base services, and triple play via fiber to the house will be available soon. Have a plan for LTE Wireless Services.

1.5: Report Layout

01. In chapter one, we discussed introduction, motivation, internship objectives, BTCL, and a preview of ICT.

02. In Chapter Two, we study organizational information introduction, the history of the telecom industry, the basic structure of the organization, BTCL capacity and connection.

03. In Chapter Three, we explore daily internship tasks and activities, activities and events project tasks and activities, and challenges.

04. In Chapter Four, I explore Earned Competencies, Smart Planning, and Reflection.

05. The scope of further career opportunities in the networking industry is briefly described in Chapter five Discussion and Conclusion.

CHAPTER 2

ORGANIZATION INFORMATION

2.1: Introduction to the company

BTCL usually provides telephone connection and internet services. It handles telephone and internet services as well as distance calls.

Figure 2.1: BTCL logo[1]

- Bangladesh Telecommunication Company Limited is simply known as BTCL
- It is a company formed according to Companies Act, 1994.
- It is a Government owned Public Limited company.
- Mostly Government Officials and representatives from Professional bodies are appointed as Member of the Board of Directors.
- Government reserves the provision to offload a significant part of BTCL's share to the public.
- BTCL Provides both of internet and Telephone service in Urban Area.
- BTCL has a net worth of Rs 15,000 crore and employs about 13,000 people.
- BTCL is a well reputed Govt. Telecommunication Company in Bangladesh.

2.2: History

Samuel Morse created the Telegraph in 1837.

East India Company builds an electric telegraph line between Calcutta and Diamond Harbor in 1850.

In 1853, British India establishes a telegraph branch under the Posts and Telegraph Department.

India builds 4000 mile telegraph lines in 1853.

In India, telegraph service was made available to the general public in 1855.

1858: The India-Sri Lanka telegraph cable is built;

1885: The Telegraph Act is passed;

1886: Copper wire replaces iron wire;

and 1895: The phonogram is introduced in India.

Wireless Telegraphy was established in India in 1902.

In India, the postal and telegraph administrations united in 1914.

1933: Wireless Telegraphy Act

1944: Hindi script introduction

1962: Pakistan Telegraph and Telephone Department reconstructed

After the liberation struggle, the Bangladesh Telegraph and Telephone Department was reconstructed under the Ministry of Posts and Telecommunications.

1975: Renamed Telegraph and Telephone Board.

1979: Reconstituted as Bangladesh Telegraph and Telephone Board (BTTB), with authority to award telecom and wireless licenses.

Bangladesh Digital Telex Exchange, 1981

Automatic Digital ITX started in Dhaka in 1983.

BTTB introduces the coinbox telephone in Bangladesh in 1985.

Bangladesh receives the GENTEX telegraph communications service in 1989.

Bangladesh Rural Telecom Authority was granted a license to operate exchanges in 200 upzillas in 1989.

1989: Sheba Telecom acquired permission to operate exchange is 199 upzilla.

Pacific Bangladesh Telephone Limited and Bangladesh Telecom were granted cellular phone licenses in 1989.

1992: BTCL and Telephone Shilpa Sangstha create the country's first magnetic card phone service (1400 units)

BTTB and TSS launched card telephone service in Bangladesh in 1995.

1995: BTTB regulatory authority is given to the Ministry (MoPT)

1995: Dhaka's second and third ITXs are installed.

Grameen Phone obtained a cellular mobile telephone license in 1996.

Telecom Malaysia International Bangladesh was granted a cellular phone license in 1998.1998:

Telecom Policy by Ministry of Post and Telecommunications

1999: 1130 units of chiptype cardphone installation begins in the country

2000: Global Telecom Service (GTS) Telex Exchange venture with British Telecom

2001: Telecommunication Act, to establish Bangladesh Telecommunication Regulatory Commission (BTRC)

2002: ICT Policy

2004: Licensing Procedure by BTRC

2004: Teletalk cellular mobile launched

2004: Interconnection Regulation by BTRC, Amendment: 2008

2004: BTRC (Licensing Procedure) Regulations, Amendment: 2009

2006: Telecommunication Act-2001 Amendment

2006: NGN (Next Generation Network) introduced in BTTB

2007: International Long Distance Telecommunication Services (ILDTS) Policy by BTRC

2008: Bangladesh Telegraph & Telephone Board (BTTB) was converted into Bangladesh Telecommunications Company Limited (BTCL) on 01 July with 100 shares owned by Government and with 9 directors, headed by secretary of Ministry of Post and Telecommunications (01 July 2008)

2009: Magnetic Cardphone and Chiptype Cardphone service withdrawn

2009: BTTB ordinance-1979 Amendment (BTCL Act)

2009: National Broadband Policy by Ministry of Post and Telecommunications

2010: ILDTS Policy

The BTRC issued a recommendation in 2010 for SMS-based Premium Rate Services.

The BTRC issued a video conferencing guideline in 2010.

The BTRC issued a guideline on telecom infrastructure sharing in 2011.

BTRC increases ISP, VSAT, and call center license fees in 2012.

The BTRC issued a BPO/Call Center recommendation in 2013.

2013: BTRC and Bangladesh Bank provide directives on mobile financial services.2014: (10/02/2014) Ministry of Post and Telecommunication and Ministry of Information and Communication Technology are integrated to Ministry of Posts, Telecommunications and Information Technology.[2]

Fig 2.2: Old logo of BTTB[3]

2.3 Services of Company

1 . Telephone (with internet)

2 . Data & Internet

3 . transmission

4 . Domain & Hosting

5 . IPLC

6 . Alaap

7 . ICX & IGW

2.3.1 Internet Service

BTCL is the most easily available Internet service provider in the country, with dial-up Internet connection available in all 64 districts. It has 32,433 dial-up subscribers as of January 2009. BTCL has been attempting to improve its dial-up Internet connectivity in order to boost customer satisfaction since the beginning of 2007. It is also in charge of.

Under the BCUBE brand, BTCL offers client broadband Internet services. The service is provided using ADSL2+ technology. EMEM Technologies Ltd, System and or Service Ltd (SSL), and Sis view Technology Ltd have taken over BTCL's BCUBE sales, service, and support. BTCL now has over 15,000 customers. BTCL gets roughly $19,000,000 each monthly from this service.

2.3.2: BTCL Exchange Structure

Every communication system has a structure. BTCL also have a structure of its communication. The block diagram figure is a part of BTCL communication structure.

Figure 2.3: BTCL Communication Structure

Switch: This allows for switching in a specified location. Subscriber loops in that region link to the local switch.

Transit switch: This is comparable to a tandem switching, except it is only used for long-distance connection. In current switch, integrated software provides a broad range of services and capabilities they can deliver without the requirement for human contact.

Horizontal: MDF is main distribution frame. All the wire is connected in MDF.

Vertical: MDF send a group of wire in cabinet. Such as 800 to 2400 pair.

2.4: SWOT Analysis

Organization

- The largest Telecommunication in Bangladesh
- This is Govt. Own Telecommunication Company & Always getting support from Bangladesh Govt.

- Varity of services, provide internet & Telephone line to offices/home/organization/ Govt. offices/ Private offices.
- It has many branch all over the country.
  Maintaining lot's of Equipment, and Employees.

Weaknesses:

- Employees are in short supply.
- Workers are unmotivated, and the pay structure is inadequate.
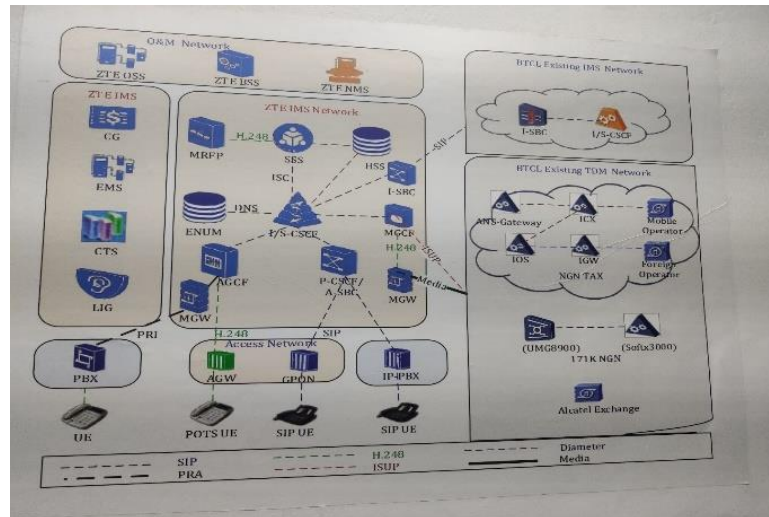- In comparison to the private sector, marketing is abysmal.
- Insufficient Equipment

Figure: 2.4: Organogram of BTCL

CHAPTER 03

TASKS, ACTIVITIES & PROJECTS

3.1: Daily Work and Activities

During my internship, I worked in both the switch room and the outside plant (OSP). Visit each place.

3.2: Project Task and Activities

I would collect applications from customers for telephone lines & internet lines and later update them on BTCL's own Web portal and help customers with various inquiries.
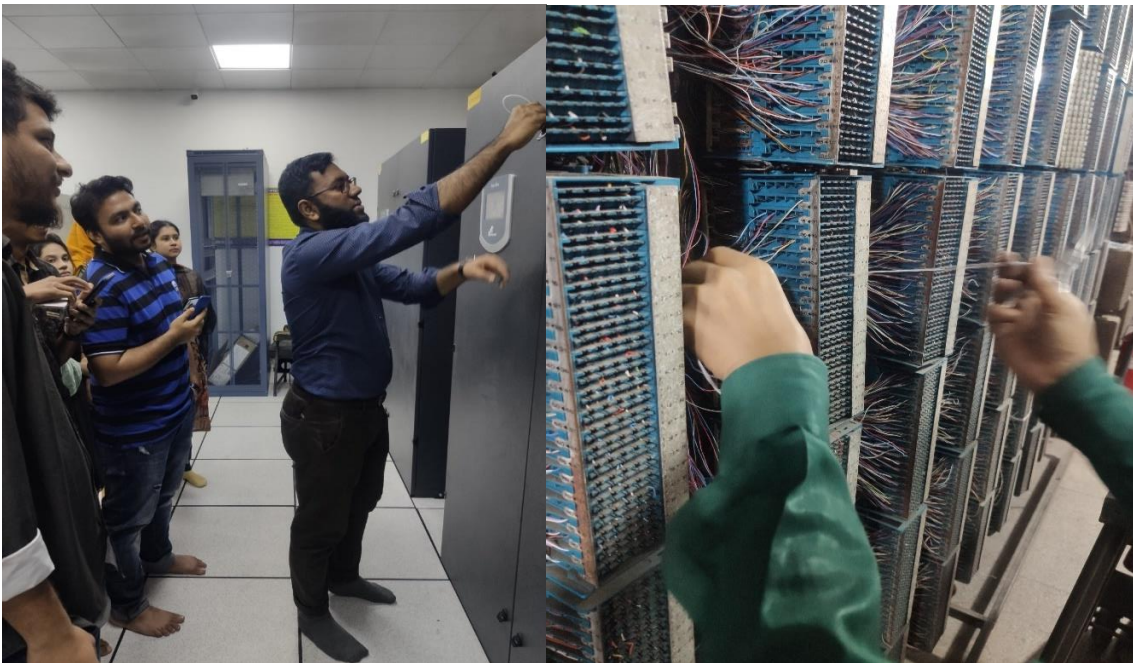

Figure 2.5: Field Work

Task in OSP

And while working at OSP I went to the field at different times and worked directly. I have witnessed the work of connecting the fibers, fixing the problems of the fibers, cutting the fibers etc.

Figure 3.2: PDA (Personal Digital Assistant)

3.3: Difficulties

The telecommunications sector encompasses a wide variety of issues that cannot be recognized or addressed in such a short amount of time, but I have done my best.
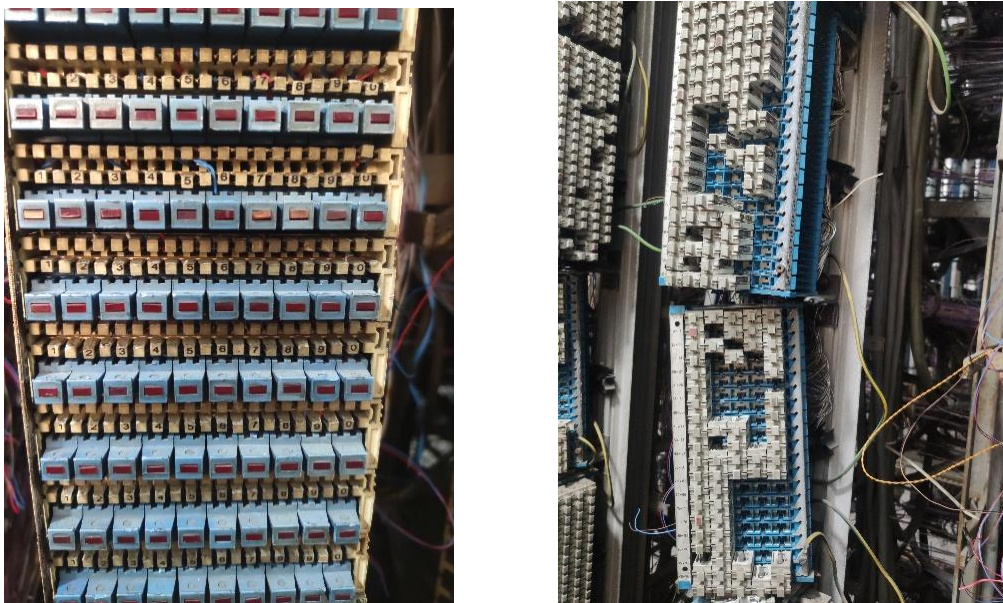

Figure 3.3: Connections

CHAPTER 4

TELECOMMUNICATION NETWORKS

4.1 Telecommunication Networks

Data transmission and exchange are made possible through a network of connections and switch, in addition to the controls that regulate their functioning.

A network is required when a group of persons utilizing telecommunications medium desire to communicate with one another. In theory, any user in a completely connected architecture (akin to the connection used during the early days of telephone) might be provided with such a direct point-to-point connect to all the other clients; however, this technique is impractical and costly, especially in a large and dispersed network.

4.2: Types of Networks

- Switched Communication Network
- Broadcast networks
- Network Access
- Scheduled Networks
- Random Access
- CSMA (Carrier sense multiple Access)

4.3.1: Switched Communications Networks

It switches communications system delivers data from one location to another using a network node network. There are two methods for swapping. A physical hardware path is constructed and maintained in a circuit-switched networks for the length of communication. The classic (analog) telephone system is an example of this type of network.
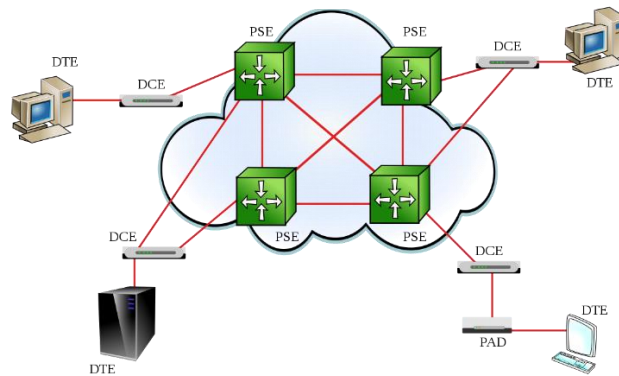
Figure 4.1: Switched Communications Networks[4]

4.3.2: Broadcast networks

A broadcast network bypasses the onerous routing operations of a network connection by guaranteeing that each network node's broadcast are acknowledged by all other network nodes. As just a result, a huge network has only one communication channel. Local area networks (LANs), for example, can be created as broadcast networks, with one client linked to each networks and nodes typically grouped in a circular, ring, or star topologies, as shown in the diagram. In a wireless system, nodes linked by radio or graphic channels can communicate.
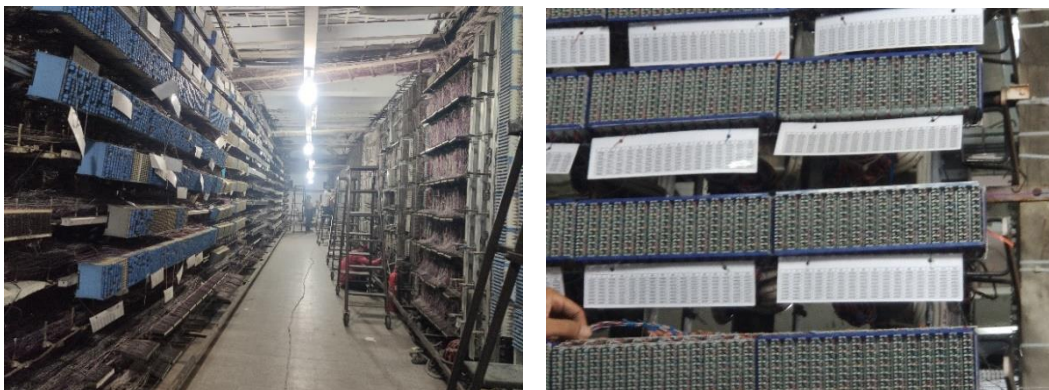
4.3.3: Network Access

Figure 4.2: FDM

Because each node in a network can hear every broadcast, a technique must be devised to offer a communication network to the node or nodes having data to transmit while reducing harmful collisions (simultaneous transmissions). Multi-carrier communication may be built using

scheduling (a process in which nodes alternate broadcasting in a systematic way) and memory management to the channel.

4.3.4: Schedule Network

Each node is assigned a time slot in turn on the inside of the time-division multiple access (TDM) programming system, which it uses if it has something to communicate. Because no data is delivered during calm station time slots, TDMA can be wasteful if nodes are much busier than others.

4.3.5: Random Access

Timetabled access techniques have several drawbacks, including the significant latency required for allocation, monitoring, and token passing activities, as well as the danger of extended inactive periods only when a few nodes are broadcasting.
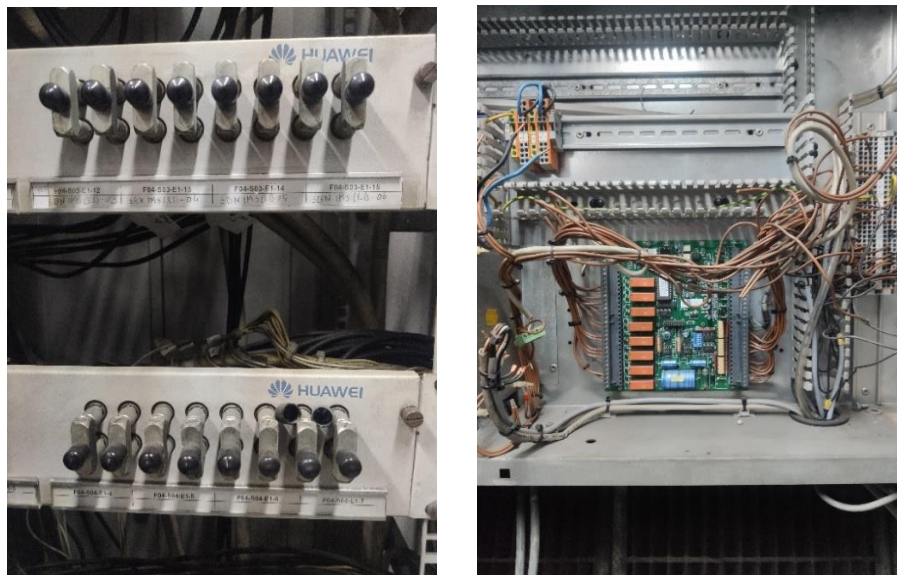

Figure 4.3:Connection

4.3.6: CSMA(Carrier sense multiple Access)

Using the random-access approach of carrier sense multiple access, the likelihood of collisions is reduced (CSMA). When a node employs this technique, it first scans the network before transmitting when it notices that the route is currently congested. A node can falsely see a busy channel as idle and send, which would cause a collision, due to different delay in network transmission and node analysis.

4.4: Open System Interconnection (OSI) model

The International Organization for Standardization (ISO) created the open systems interconnection (OSI) paradigm to allow different communication systems to communicate using standard protocols. In layman's terms, an OSI creates a standard for different computer systems to communicate with one another.

The OSI Model can be conceived of as a universal language for computer networking. It is based on the concept of breaking a management program into seven abstract layers, each of which is stacked on top of the preceding one.
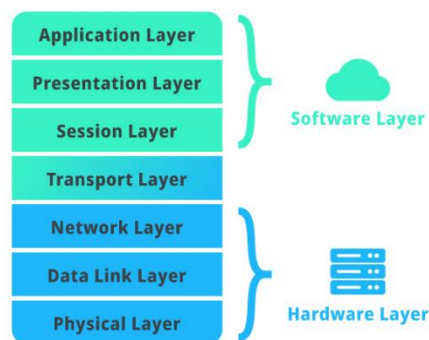

Figure 4.4: OSI [5]

4.4.1: Physical Layer

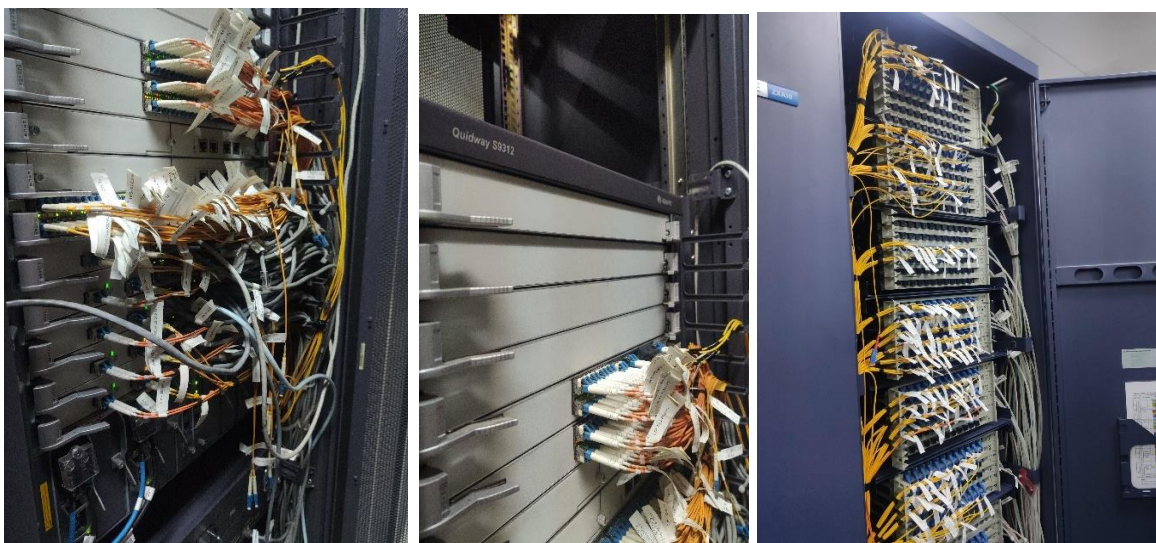The initial and cheapest layer of a Open Systems Interconnection Model is the physical layer (OSI Model.)

Figure 4.5: Physical Layer

4.4.2: Data Link Layer

This layer makes data accessible to consumers by putting it into simple study frameworks. This makes sure that data is accurate and gets to the next layer on time.
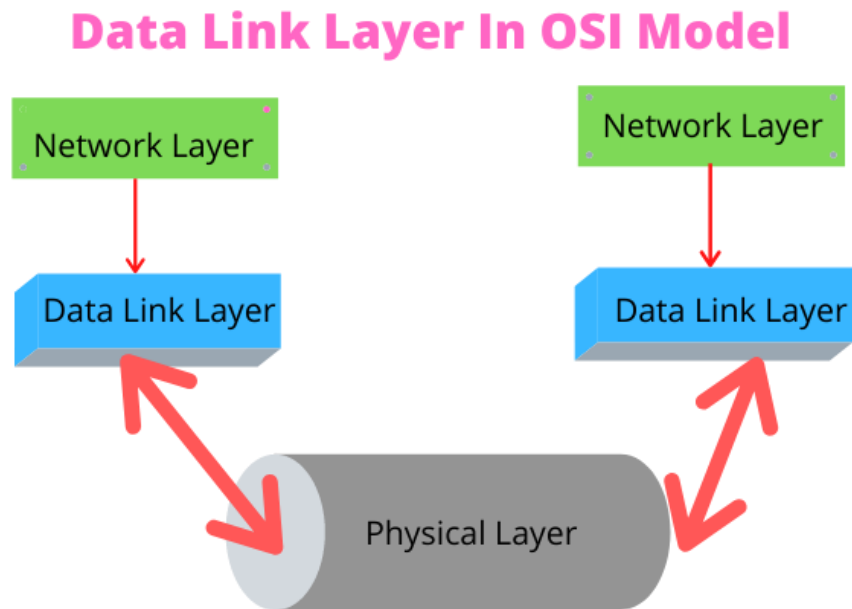

Figure 4.6: Data Link Layer [6]

4.4.3: Network Layer

The network layer has two basic functions. One approach is to break segments into network packets, which are subsequently reassembled on the receiving end. The following is an example of a route, which you may use to determine the best route for you.[7]

4.4.4: Transport Layer

The transport layer takes data from the session layer and separates it all into "segments" here on receiving end. It is in responsible of reconstructing the segment and transforming it back to data that layer may use. The transport layer is in charge of flow control, which involves sending data at a rate that matches the receive device's connection speed, as well as error control, which involves assessing if data was received incorrectly and, so if, requesting it again.
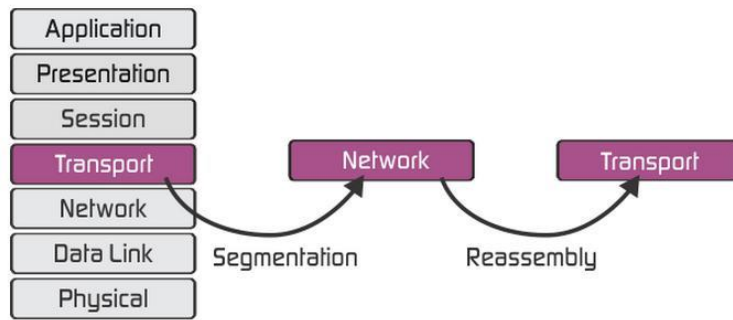
Figure 4.7 : Transport Layer[8]

4.4.5: Session Layer

The session layer creates communication channels, known as sessions, between devices. It is in responsible of establishing sessions, keep those open and functioning while data is transmitted, and closing them after communication is complete. The session layer also can set checkpoints during a data transfer; if the session is terminated, devices can resume transmission of data from the most recent checkpoint.
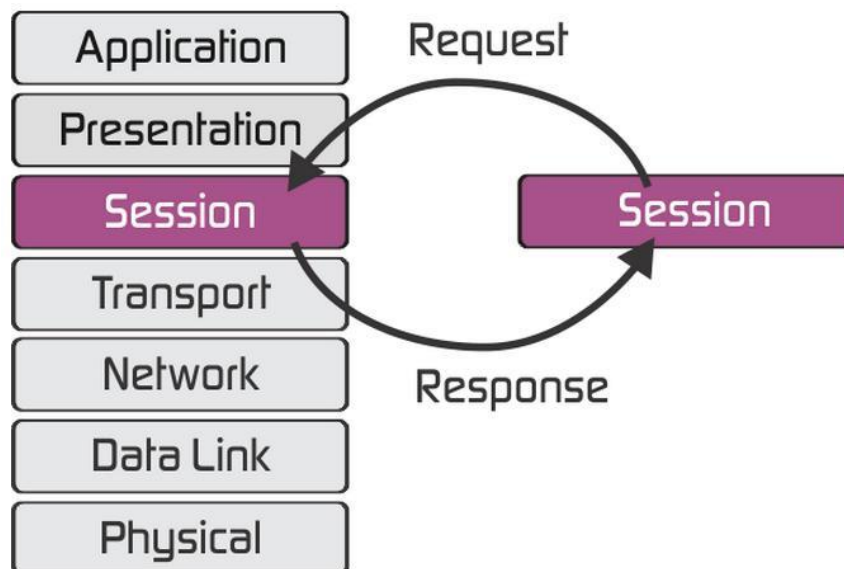

Figure 4.8 : Session Layer[9]

4.4.6: Presentation Layer

Data preprocessing for the application layer is handled by the presentation layer. It defines how a number of devices must encode, decrypt, and compress data so that it is received correctly on the other end. The presentation layer prepares any information transmitted by an application layer for transmission over the session layer.
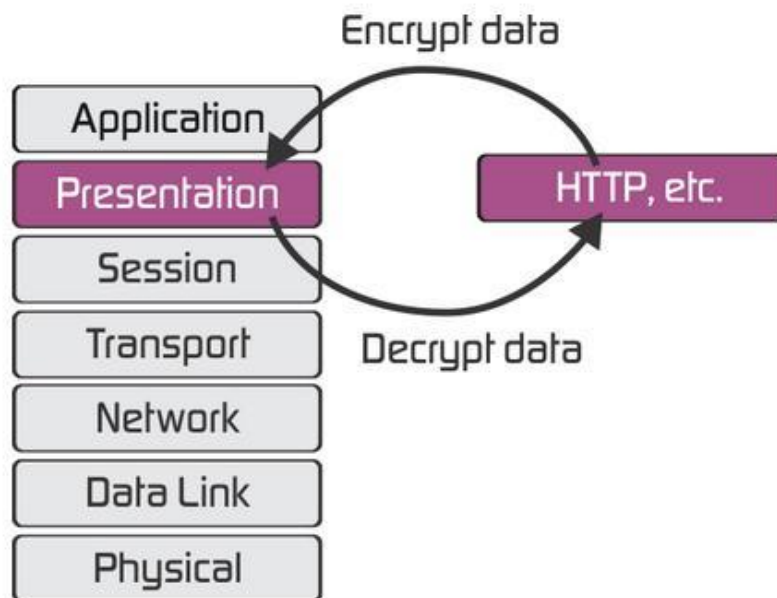

Figure 4.9 : Presentation Layer[10]

4.4.7: Application Layer

The application layer is used by end frameworks such as browser and email programs. It provides protocols that allow software to communicate and receive information as well as display important information to customers. The Hypertext Transfer Protocol (HTTP), File Transfer (FTP), Post Office Protocol (POP), Simple Mail Transfer Protocol (SMTP), and Domain Name System are all examples of application layer protocols (DNS).
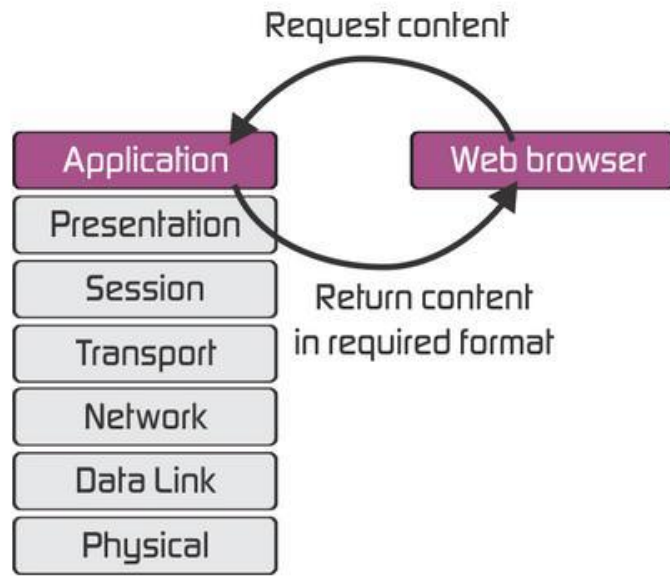
Figure : 4.10 Application Layer[11]

CHAPTER 5

BTCL TELEPHONE NETWORKS

5.1: Public Switched Telephone Network (PSTN)

The PSTN routes your voice calls from your phone—whether a telephone or a cell phone—to the recipient's mobile. Interfacing the internet as well as the PSTN has traditionally been costly and complex, that is why VoIP (Voice over Internet Protocol) is becoming increasingly dependable and popular. VoIP replaces the obsolete PSTN by transmitting and receiving voice communications (as well as other forms of communications) via the internet.

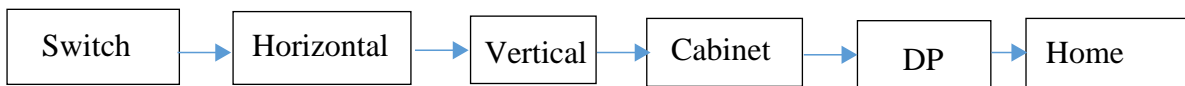Switch → Horizontal → Vertical → Cabinet → DP → Home

Figure 5.1: PSTN Network

5.2: Switching and Routing in Hierarchy

The following two key systems are the switch hierarchy & telephone line routing. Trunk lines connect the exchange and enable calls to also be routed from different places to the same exchanges.

Trunk Groups are collections of trunk lines that connect many exchanges.

- Star Topology
- Mesh Topology □ Hierarchical.

Star Topology:

The star topology, also known as a star network, is one of the most prevalent network topologies. In this design, each node is linked to a single network device such as a hub, switch, or pc. The primary network device serves as the server, while the peripherals serve as the clients. In a star topology design, depending on the kind of network device in each computer, a coaxial or RJ-45 ethernet port is utilized. The graphic shows how this network architecture got its name since it is structured like a star.
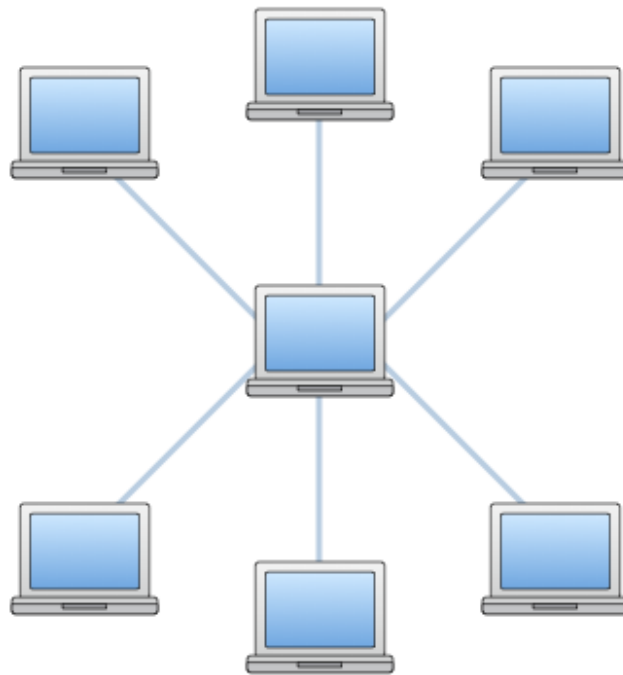
Figure 5.2: Star Topology [12]

Mesh Topology:

Mesh topology is a sort of topology of the network in which all devices inside the network are linked. In a mesh architecture, data can be routed (delivered the shortest distance) or flooded (sent to all devices).
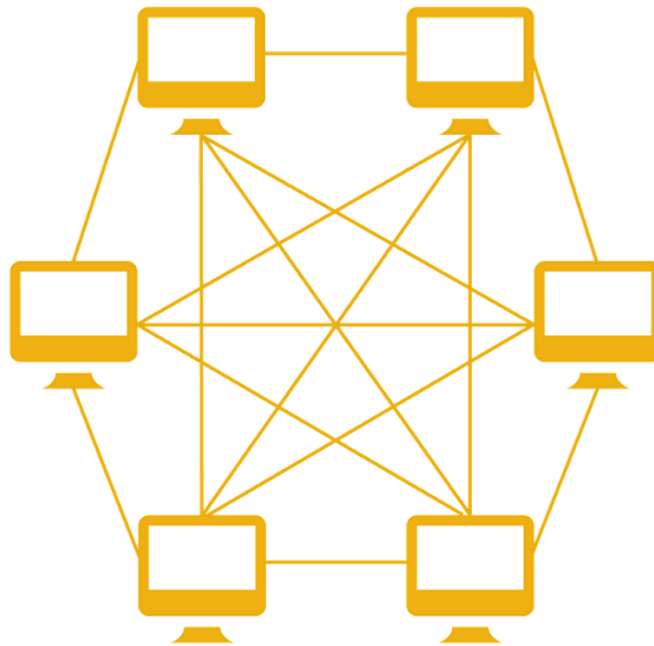
Figure 5.3: Mesh Topology [13]

Hierarchy:

Hierarchical architecture is utilized to support significant traffic while limiting the number of trunk groups. Following that, the traffic is routed in the ultimate direction, that is at the highest level of the hierarchy. Direct trunks routes can be built if the volume of traffic between the two exchanges is large enough, as demonstrated by the dotted lines in the image below. These straight trunk roadways get a lot of traffic. Traffic jams occur anywhere these high-traffic roads are located. Overflow traffic is managed hierarchically in this part. It is forbidden to use overflowing traffic from the final route.

5.3: Plan for Transmission

Signal transmission over wires must be of high quality to ensure successful communication. Calls for establishing transmission links between national and global circuits should be upgraded so that they may converse concurrently.

5.4: Plan for Charging

Calls are either charged according to the metering devices connected to a consumer's line or according to a set of rules. Each customer receives a metering register in the event of an electronic exchange. A meter keeps track of the amount of charging units, and sending a pulse to the meter raises the count. If a charge is applied to the charger, a bill for the number of units read by the meter is generated.

CHAPTER 06

POWER, AIR-CONDITION AND ALARMS FACILITIES

6.1: Switch room Management

The offer must have the proper electrical and air-conditioning apparatus in order for the Switching system to function. The power plants' facilities are mentioned below. BTCL uses power in two ways.

6.2: Alternating Current (AC)

Direct current is used to power the phone. These two wires offer a complete duplex balancing voice path, alternating current power to ring a phone bell or electronic ringer, and direct current power to the phone electronics. It's a balanced closed-loop system with no external connections. If both phones are connected to the POTS line, the voltage should be around 48 volts DC..

Rectifier:

The offer must also include the rectification modules needed to power the systems and charge the battery packs with current (DC). In his bid, the Bidder must include his DC power parameters as well as the backups battery constant voltage over a 10-hour recharging. It is required to employ electronic switch-mode rectifier diodes with automatic redundancy and charge management capabilities. To swap OMM, the panel must have visual and auditory alarm characteristics, as well as the requisite alarm loops.

Figure 6.1: Rectifier

Inverter:

The contract must include the required DC to AC inverters module for supplying AC power to any devices that require it. The systems in addition will provide power. Electronics switch-mode inverters with automatic redundancy control are required.

To swap OMM, the panel must have visible and audible alarms capabilities, in addition to the requisite alarm loops..

Figure 6.2: Inverter

Battery:

If indeed the AC power goes out at SHER-E-BANGLA, the bid must include the requisite battery sets in addition to a backup DC power source. The Bidder must provide a detailed description of his Dc / dc specifications that he included in his bid offer. Each battery set should have two separate circuit breakers with sufficient power (one on the rectifier end and one on the battery end) to allow the battery set to be completely disconnected during any O&M function that is required.

Figure 6.3: BTCL Battery Room

Generator:

A generator is used by BTCL for backup control. When the alternating current is no longer available, the generator delivers power even if the battery is not fully charged. To put it another way, no energy should be wasted in any way.

Figure 6.4: BTCL Generator Room

6.3: Air-Condition

Both the trade air conditioning system and the OMC rooms must be included in the winning proposal. In his or her bid, the Bidder must submit a thorough description of a air-conditioning system specifications.

Figure 6.5: Air-Condition

6.4: Temperature Alarms

The ICT market is actually increasing rapidly. In this line of work, sensitive parts in host room, transfer rooms, and other critical equipment must be inspected on such a regular basis. Temperature management is critical with this procedure.

6.5: Temperature Monitoring and Alerting System in the Cloud (OTMAS)

Temperature data is sent from a sensor to the built-in Online Monitor Of Temperature & Alert Systems, which transmits it to a selected destination by SMS or a website link. This IoT-enabled device is designed to monitor temperature in server rooms, switch rooms, and other air temp infrastructures where machinery generates a significant amount of heat. Air conditioning is frequently used to regulate temperature. If the air conditioner fails, the temperature can quickly rise, possibly damaging sensitive equipment and posing a fire threat. The low-cost OTNAS system regulates temperature and alerts the proper workers, saving a lot of time and reducing the danger of damage.
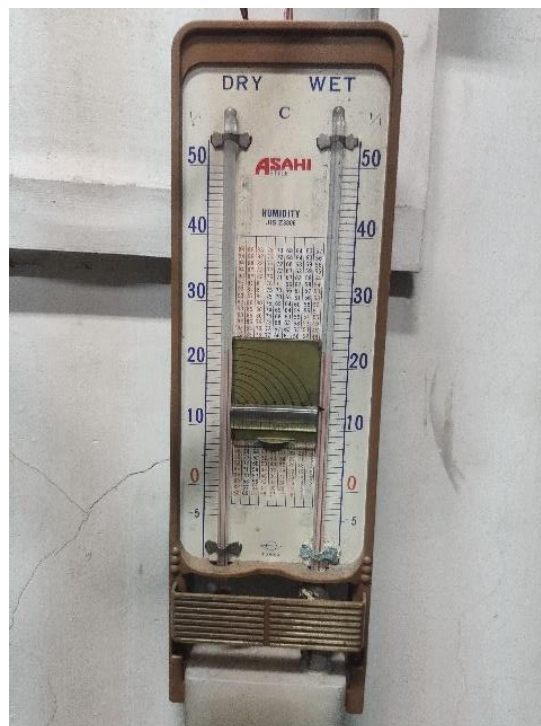

Figure 6.6: Alarm machine

CHAPTER 7
CONCLUSION & FUTURE CAREER

7.1: Conclusions of the Discussion

Trying to implement innovation and research on telecommunication services operations, a dynamic and important portion of the telecommunication sector, is a massive, difficult, professional, and thing project that necessitates among other things, superior analytical skills, quick learning skills, and excellent observational skills. . As a consequence, I am relieved and pleased to have done and reported my paid internship in this well-established telecommunications business in a nice setting. My accomplishment is due to God's favor, the teachings of my famous Daffodil International University teachers, and the management of a BTCL Manikganj Exchange Telecom Division. In addition to my tremendous effort and good hard work, I have received respect from friends and family. Given my diligence and candor, I would be overjoyed if my internship study on the BTCL.

7.2: Possibilities for a Future Career

As a student pursuing a widely esteemed degree in Computer Science and Engineering, my apprenticeship to Bangladesh Telecommunications Company Limited has always been enormously enlightening and beneficial, allowing me to engage in critical and inventive practical classes while putting my theoretical talents to good use. Daffodil International University, my favorite educational school, features very talented and very well faculty members. My famous Instructor, in particular, has assisted me in overcoming any challenges that have arisen throughout my internship. As a consequence, I am grateful to my respected lecturers as well as Bangladesh Telecoms Company Limited (BTCL) for providing me with such a realistic environment in which to polish my telecommunication abilities. As a result, I am looking forward to looking back at my internship as a watershed moment in my career.

Appendix

Company Details

Name: Bangladesh Telecommunication Company Limited (BTCL)

Address: Head office 37/E, Telejogajog Bhaban, Eskaton Garden Dhaka.

Tel: +880248311500

Email: md@btcl.gov.bd

Call Center :   16402

Website: http://www.btcl.gov.bd/

REFERENCS

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