BTCL: The Foundation of Bangladesh's Telecommunication Network

BY

Amjad Hosan

ID: 182-15-11521

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

Supervised By

GAZI ZAHIRUL ISLAM

Assistant Professor

Department of Computer Science and Engineering

Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

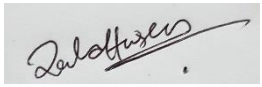
APRIL 2021

APPROVAL

This Internship titled **"BTCL: The Foundation of Bangladesh's Telecommunication Network"** submitted by **Amjad Hosan** and ID No: 182-15-11521 to the Department of Computer Science and Engineering, Daffodil International University, has been accredited in terms of style and content as satisfactory for partial fulfillment of the criteria for the degree of B.Sc. in Computer Science and Engineering (BSc). The presentation took place on time.

BOARD OF EXAMINERS

Dr. Touhid Bhuiyan — **Chairman**
Professor and Head
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Zahid Hasan — **Internal Examiner**
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

Md. Riazur Rahman — **Internal Examiner**
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University

External Examiner

Dr. Md Arshad Ali
Associate Professor
Department of Computer Science and Engineering
Hajee Mohammad Danesh Science and Technology University

DECLARATION

It is hereby announced that the work described in this internship report was carried out by me under the supervision of Mr. Gazi Zahirul Islam, 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. This article is my real work, and I declare it to be. I certify that no part of this article, or any part of it, has been submitted elsewhere for the purpose of obtaining a degree.

Supervised by:

Gazi Zahirul Islam

Assistant Professor

Department of Computer Science and Engineering

Daffodil International University

Co-supervised by:

Mr. Abbas Ali Khan

Senior Lecturer

Department of Computer Science and Engineering

Daffodil International University

Submitted by:

Amjad Hosan

ID: 182-15-11521

Department of Computer Science and Engineering

Daffodil International University

ACKNOWLEDGEMENT

First of all, I want to express my heartfelt gratitude to **Mr. Gazi Zahirul Islam, Assistant Professor,** Department of Computer Science and Engineering, Daffodil International University, Dhaka, for his unwavering guidance. Throughout the internship and report writing process, his understanding, motivation, direction, and directions have provided a solid foundation for this work. His contributions to the advancement of the ideas in this study have made a significant contribution to the completion of this work.

I'd also like to express my gratitude to everyone else who has supported and encouraged me during my internship, whether directly or indirectly. I am grateful to Bangladesh Telecommunications Company Limited (BTCL) for providing me with an internship opportunity at their IT Operations Center. Many helpful people assisted me in writing the report by providing data, information, procedures, and management processes as required, and by clarifying various concepts.

I'd also like to thank **Dr. Touhid Bhuiyan** Head of the Department of CSE, as well as other faculty and staff members of Daffodil International University's CSE department, for their assistance in completing my internship. I'd like to thank my parents in particular for their support and motivation during my life and professional career.

Finally, I'd like to express my heartfelt gratitude to Allah, the beneficent, the sublime.

ABSTRACT

BTCL is a voice carrier, IGW, IIG, ICX, ISP, NGN, and PSTN operator, as well as a CC Domain Registrar (.BD). BTCL owns and operates almost all of the country's copper, fiber optic, and microwave networks. The Post and Telegraph Division of BTCL was established in 1853. BTCL is now a wholly owned government subsidiary. One of the most essential services offered by BTCL is landline telephone service. Dial-up, ADSL, high-bandwidth local and international leased lines, VPN, MPLS, country domain (.bd), co-location, and other services are all available. NGN will soon provide soft switch services as well as triple play on fiber at home.

I wrote this paper after completing a four-month internship at Bangladesh Telecommunications Company Limited. This internship program provided me with the ability to learn about the day-to-day activities of a telecommunications company. The emphasis of this article is on my observations and company experience.

TABLE OF CONTENTS

LIST OF FIGURES

FIGURE **PAGE No.**

LIST OF TABLES

TABLE

Chapter 01

INTRODUCTION

1.1 About BTCL

Bangladesh Telecommunications Company Limited (BTCL) is Bangladesh's government-owned telephone company and the country's largest telecommunications company. The Bangladesh Telegraph & Telephone Board (BTTB) was renamed after Bangladesh gained independence in 1971. The BTTB was renamed BTCL on July 1, 2008, when it became a public limited company. The company was originally owned entirely by the Bangladesh government. According to the company, the stocks were supposed to be sold to the general public the following year. The estimated value of BTCL is Tk. 15,000 crore. BTCL employs a total of 12,636 people.

In Bangladesh, BTCL offers landline and internet telephone services, as well as domestic and international long distance calls. The Bangladesh authorities announced PSTN licenses to private companies in 2004, but they were forbidden from offering services in the highly profitable Dhaka market . When other operators began to obtain licenses in 2007, BTCL's dominance was shattered.

1.2 History

In what was then British India, the Telegraph branch of the Posts and Telegraph Department was established in 1853, and was later governed by the Telegraph Act of 1885. In 1962, the Pakistan Telegraph and Telephone Department was established in what was then East Pakistan.

Post-independence

Figure 1.1: BTCL's old logo, previously known as Bangladesh Telegraph and Telephone Board (BTTB)

Just after Bangladesh's independence in 1971, the Ministry of Posts and Telecommunications established the Bangladesh Telegraph and Telephone Department. By enacting the Telegraph and Telephone Board Ordinance, 1975, this was transformed into a corporate body known as the "Telegraph and Telephone Board." The Telegraph and Telephone Board was renamed the Bangladesh Telegraph and Telephone Board by an ordinance passed in 1979. (BTTB).

1.3 Bangladesh Telecommunications Company Limited (BTCL)

On July 1, 2008, BTTB became Bangladesh Telecommunications Company Limited BTCL, a government-owned Public Limited Company. Customers can now reach BTCL at any time, seven days a week. Customers in Dhaka will be able to call the number and meet with the BTCL for inquiries, according to a company press release. For VIPs, BTCL maintains a reliable and always-on red telephone exchange.

BTCL's facilities

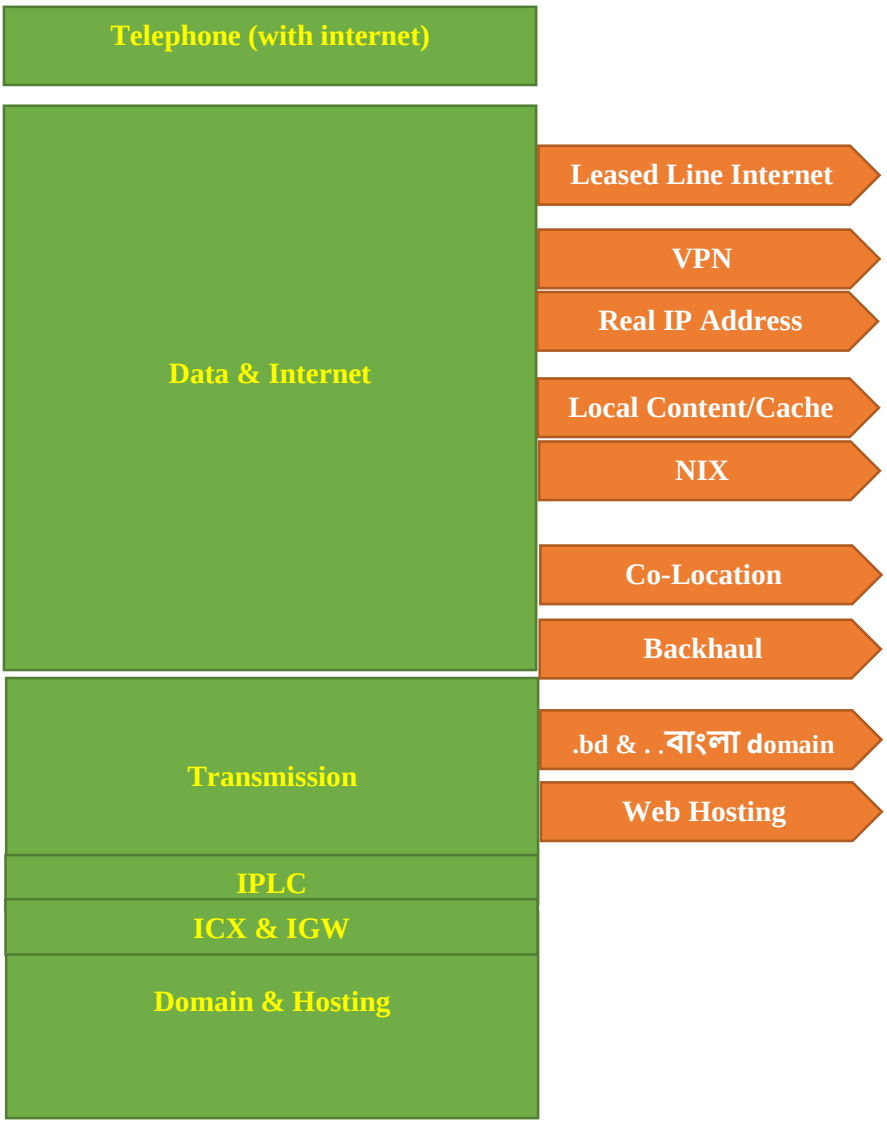


Figure 1.2 BTCL's facilities

CHAPTER 02
EVOLUTIN OF TELECOMMUNICATION

2.1 Bangladesh Telecommunications

In 1989, Bangladesh's telecommunications sector began to liberalize in small steps, with the issuance of a license to a private operator for the provision of cellular mobile services, among other items, in order to compete with the former monopoly provider of telecommunications services in Bangladesh, the Bangladesh Telegraph and Telephone Board (BTTB). In the late 1990s, the number of fixed and mobile networks deployed in Bangladesh increased dramatically, and the number of services in use has increased steadily in the last five years.

The industry's growth has been aided by government and private sector incentives, and it is now one of Bangladesh's most significant industries. It has attracted a large number of foreign investors as a large country with a large market.

2.2 History of Telecommunications

The telecommunications industry in Bangladesh is rapidly expanding. The Bangladesh Telecommunication Regulatory Commission (BTRC) is in charge of licensing, policy, and other matters in the field.

- 1853- British India's Posts and Telegraph Department establishes a telegraph branch.
- 1971- The Bangladesh Telegraph and Telephone Department was introduced by the Department of Posts and Telecommunications.
- 1975- Reconstruction of the Telegraph and Telephone Board.
- 1979- With the authority to issue telecom and wireless service licenses, it was renamed Bangladesh Telegraph and Telephone Board (BTTB).
- 1971- Wireless Telex Exchange in Bangladesh.
- 1983- In Dhaka, the Automatic Digital ITX program began.
- 1985- In Bangladesh, BTTB introduced the Coinbox Telephone service.
- 1989- The GENTEX telegraph messaging service was introduced in Bangladesh.
- 1989- Bangladesh Rural Telecom Authority was granted permission to operate exchanges in 200 upazillas.
- 1995- In Bangladesh, BTTB and TSS introduced the Card Telephone service.
- 1995- The Ministry now has regulatory power over the BTTB (MoPT).

- 1995- The second and third ITXs have been mounted in Dhaka.
- 1996- A license to operate a cellular phone has been issued to Grameenphone.
- 1996- Telecom Malaysia International has granted Bangladesh a cellular mobile license.
- 1998- Policy on Telecommunications
- 2000- Telex Exchange is a joint venture between British Telecom and Global Telecom Service (GTS).
- 2001- Under the Telecommunication Act, the Bangladesh Telecommunication Regulatory Commission will be created (BTRC).
- 2002- ICT policy
- 2004- Teletalk has released a cellular phone.
- 2005- Based in Egypt Sheba Telecom was bought by Orascom.
- 2006- NGN was first implemented in BTTB.
- 2008- The government now owns 100% of the shares in BTTB, which has been renamed Bangladesh Telecommunications Company Limited (BTCL). The Submarine Cable Project resulted in the formation of Bangladesh Submarine Cable Company Limited (BSCCL).
- 2008- NTT DoCoMo, a Japanese company, purchased a 30% stake in Aktel.
- 2009- Warid Telecom was sold to Bharti Airtel for 70% of its value.
- 2009- Internet Protocol Telephony Service Providers (IPTSP) operators have been created.
- 2010- Robi Axiata Limited is the new name for Aktel.
- 2012- In October, Teletalk, a state-owned corporation, launched a 3G mobile service.
- 2013- A 3G auction was held for private companies.
- 2014- In 64 districts, Grameenphone, Banglalink, and Robi have 3G coverage.
- 2016- Robi and Airtel merged on November 16, 2016, and Robi became the merged company.
- 2018- A 4G action was taken for private companies.
- 2018- On February 19th, the 4G mobile service was launched.

2.3 Structure of Telecommunications

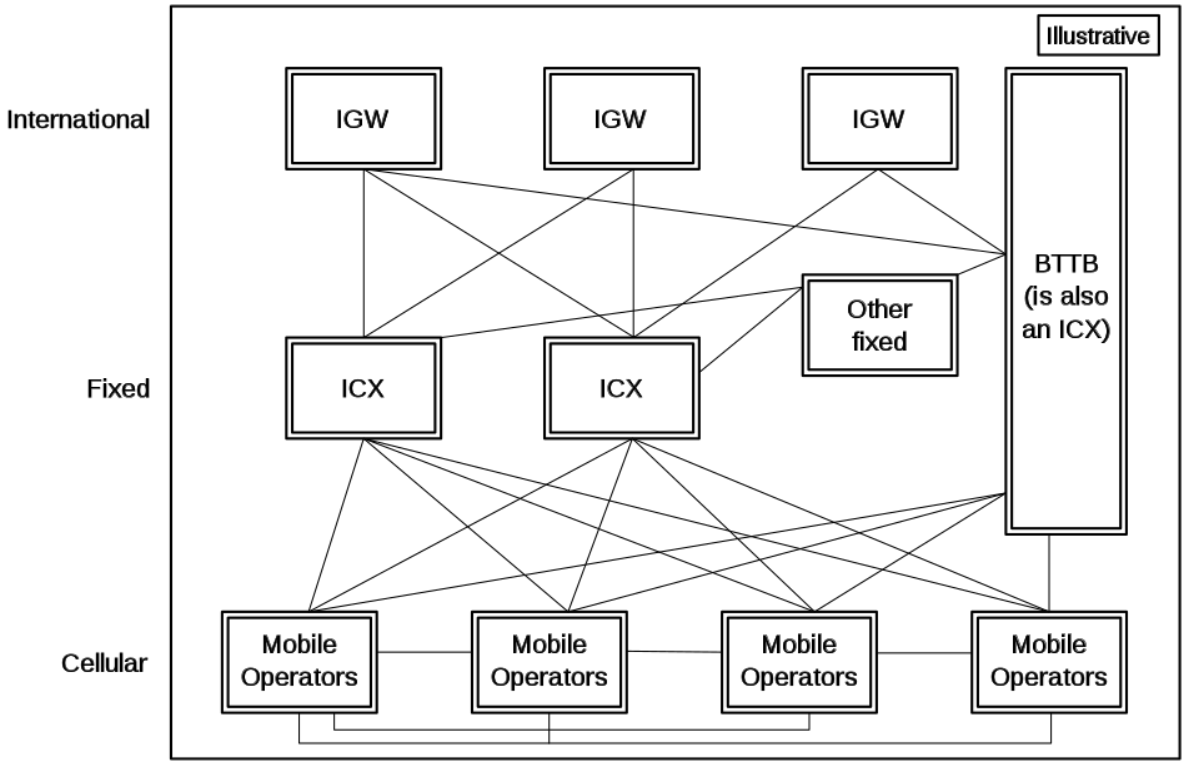


Figure 2.1: Topology of Bangladesh's Telecom Network

According to 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 an International Gateway (IGW) that is connected to both mobile and fixed operators via ICXs. When a mobile or fixed operator makes a call to another network, If the call is local, the Interconnection Exchange (ICX) receives it and forwards it to the destination network; if the call is international, the IGWs receive it..Calls obtained from IGWs will also be sent to the destination number by ICX.

The diagram below depicts the structure of interconnection between various interfaces.

CHAPTER 03

FUNDAMENTALS OF TELECOMMUNICATION

3.1 Switching Fundamentals of Telecommunications

- Ring-down circuit for a basic four-phone network
- In a telephony signaling technique known as ring-down, a telephone ringing current is sent over the line to turn on a lamp or trigger a self-locking relay known as a drop. Ring-down is used instead of automatic signaling by dialing a number in manual operationA continuous or pulsed alternating current (AC) signal is sent over the wire as the input. It is possible to do it with or without the use of a cellular switchboard. When the magneto generator, which was either built into the phone set or housed in a wired ringer box, was activated, a drop fell at the telephone exchange switchboard, labeled with the number of the line to which the magneto telephone instrument was connected.
- A centralized operator controls the human switch.
- Analog signaling is the best choice for human contact.
    - In terms of recovery, it is neither robust nor efficient.
    - Amplifiers were used.
- Digital Signaling: Pulse-code modulation (using a repeater), Nyquist theorem
- Local loops, trunks, and switches communicate with each other.
- In-band (DTMF) and out-of-band communication between users and networks (BRI)
- The type of end user equipment determines the electrical signal characteristics between the subscriber and the switch.
- Because of the wide range of signal characteristics, different telecom networks for different services have been created.
- Telecommunications networks that are one-of-a-kind
    - Network of Telegraphs
    - Network of telex
    - Network of telephones
    - Network of data

3.1.1 Elements of the switching system

Network Switching: It establishes a connection between those who are called and those who are calling.

Subsystem of Control: This is an important part of the switching system that effectively determines switching paths by identifying inlet and outlet lines and interpreting signaling data collected on these lines. This control subsystem senses signal transmission on the lines and manages link establishment and disconnection. The control sub device sends signaling information to the subscriber and other exchanges connected to the outgoing trunks.

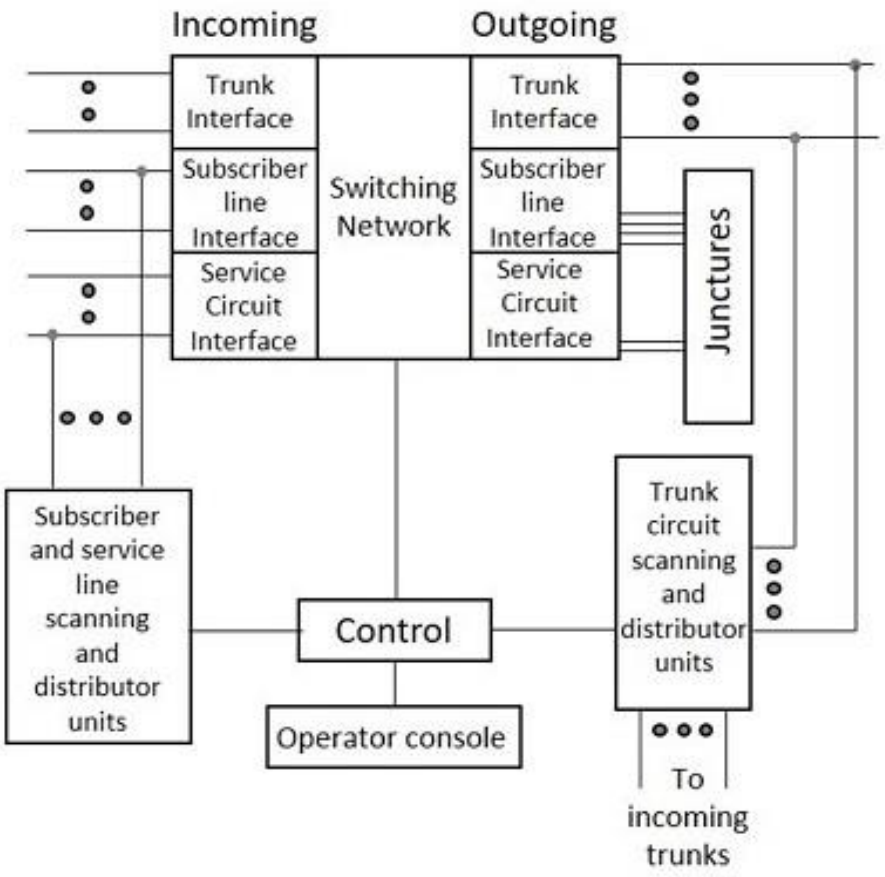


Figure 3.1: Elements of a Switching System (TSSN)

Signaling: The signaling formats and requirements for subscribers, trunks, and subsystems differ significantly. As a result, a switching system can handle three different signaling types.

- Subscriber loop signaling
- Interexchange signaling
- Interexchange or register signaling

Components that do switching, control, and signaling make up a switching system.

Interface to a Trunk: This port is where the trunk lines that connect the switching systems terminate. The trunk interface is responsible for connecting the system to the trunk lines.
Subscriber Line Interface: The subscriber lines that connect subscribers to switching systems terminate at this terminal. The subscriber line interface is where the device's subscribers' lines are connected.

Line Scanning Unit: The line scanning system senses and obtains the signaling information from the respective lines. The control subsystem uses the data obtained from these lines to identify the inlets and outlets.

Distributor Units: The distributor devices relay or send out the signaling information on the respective lines. The processing units are responsible for sending data over the trunk lines.
Operator Console: Station of the Operator The operator console enables communication with the switching system for maintenance and administrative purposes.

Service Circuit Interface: For maintenance and monitoring, the service circuit interface enables circuits to communicate with one another.

Junctures: A junction is a structure that serves as a folded connection between local subscribers and utility circuits. The folded link assists in making the connection to a local call when both the called and calling subscribers are local, and the trunk lines are not used.

3.1.2 Telecommunication Network

A telecommunication network is a set of networks that are linked together to make a long-distance call possible. Switching systems are important in a telecommunication network. Subscribers can connect with one another by switching stations. These switching networks will make up a telecommunications network. Trunks are the lines that connect the switching systems together. Subscriber Lines are the lines that connect the Subscriber's position to the rest of the network.

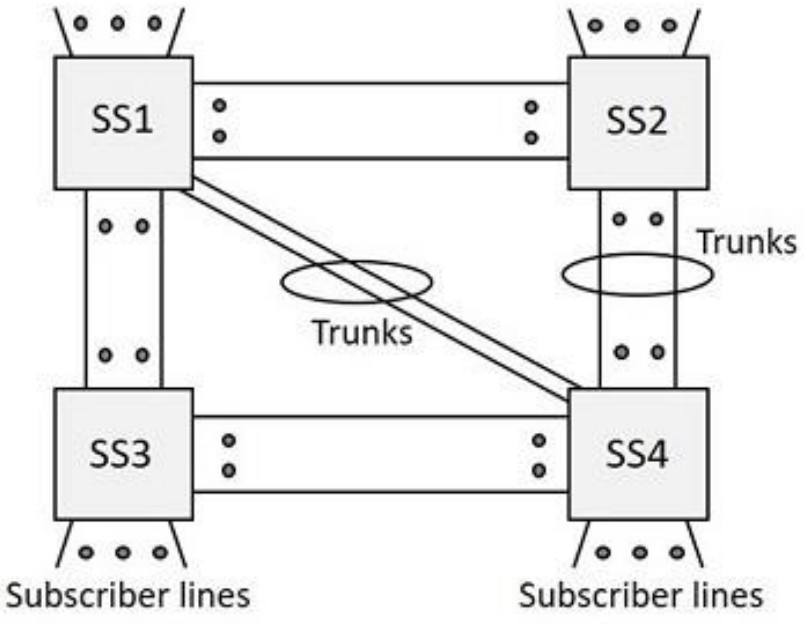


Figure 3.2: Telecommunication Network

In the early to mid-twentieth century (1900-80), if a person decided to make a long-distance call, the call was first routed to the nearest switching center's dispatcher, who then registered the calling subscriber's number and address. The operator's job was to call the remote switching center and then return the call to the calling subscriber to complete the connection. This method of making calls was given the name Trunk call scheme.

3.2 Fundamentals of Outside plant & MDF

The subscriber's Loop lines are two dedicated lines that connect to the nearest switching exchange for every subscriber in a general telephone network. Cabling is the process of connecting the exchange office to the subscriber's location. Since it is impractical to run cables from each subscriber's home to the exchange, wide cables are used to carry the drop wires (subscriber lines) to a distribution point.

At the distribution point, the drop wires a pair of wires is connected between the wires. These distribution cables from a local geographic area Hey connected to branch feed cables, each connected to connected mine feed cables, at a common feeder site. The diagram that follows will assist you in comprehending the entire process.

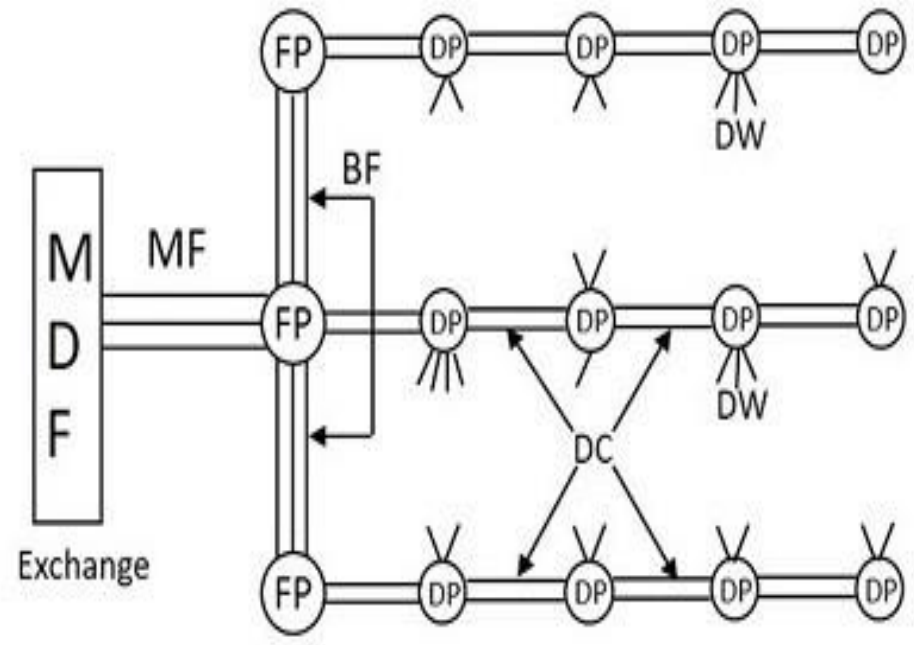


Figure 3.2: Outside plant & MDF

- MDF = Main Distribution Frame
- DP = Distribution point
- DC = Distribution Cable
- BF = Branch Feeder
- FP = Feeder Point
- DW = Drop Wires

MDF may also terminate subscriber cable pairs from the exchange via large-capacity main feeder cables. At the MDF, jumpers connect and swap these subscriber pairs, allowing the MDF to have a flexible mechanism for reallocating cable pairs and subscriber numbers. This means that if a subscriber moves to a new location within the same exchange zone, he or she will hold the same number and use a jumper, while his old drop wires will be used by a new subscriber.

3.2.1 Modern Main Distribution Frame

Figure 3.3: Modern Main Distribution Frame (MDF)

A Main Distribution Frame (MDF) is a signal distribution for a main distribution frame (MDF) is the signal distribution frame or cable rack used. ame or cable rack used in Telecommunication that connects and manages the number of telecommunication wiring between itself and the number of intermediate distribution frames and cabling from the telephone network serves. Inside a telecommunications hub, the MDF connects Cable and customer carrier's facilities to instrument. Any wire the provides solution to consumer telephone rank eventually that up at an MDF, where it is routed to local exchange instrument.

3.2.2 Distribution point

Figure 3.4: Distribution Point (Cabinet)

- From the MDF to the cabinet, multipair cables are drawn in 50 pair, 100 pair, 200 pair, and so on.
- From the cabinet to the delivery, 10 pair 5 pair cables are pulled up.
    - The key cable runs from MDF to Cabinet.
    - DP to Cabinet (secondary cable)
- A 5 or 10 pair cable is run from the cabinet to the DP. A dp has ten loops, while a dp has five loops.
- When a new link is established, a pair of cable is pulled from the DP to the house, meaning that a 10 to 5 telephone new connection can be established from a DP.

3.2.3 Cable for distribution

Figure 3.5: Distribution cable (50 pair)

25 pair and 100 pair cable are used to link the MDFs and IDFs. Individual strands of 25 or 100 pair cables are connected other devices, such as a patch panel, or to CAT5 wire, which are then connected to other devices, using Punch down Blocks.

The telephone wires that link your phones in a typical home have four colors: red, green, yellow, and black. Any phone line you have is connected to one of these pairs. In reality, since a four-telephone line has two pairs of wires, repairmen refer to wires as "pairs."

CHAPTER 04
TELEPHONE NETWORKS BTCL

4.1 Public Switched Telephone Network (PSTN)

Telephones became commercially available in 1876. At the time, there were no network networks available. Instead, telephones were wired in pairs for use between locations, making it impossible to dial more than one at a time. People who needed to communicate with people in different parts of the world needed a variety of telephones, each with its own set of features. Initially, operators had to manually connect one end of a phone call to the other.

The PSTN (Public Switched Telecommunications Network) is a global network of circuit switched telephone networks that provide public telecommunication services. POTS stands for Point-to-Second-to-Second-to-Second-to- (Plain Old Telephone Systems). On a city, local, national, and international level, telephone wires, fiber optic cables, microwave transmission links, and wireless communications are used to operate these networks.

The PSTN is made up of switches that are placed at centralized points in the network and act as nodes for connecting any two points on the network. All of the switching mechanisms previously listed, such as circuit switching, packet switching, and message switching, are different ways of using the PSTN.

For traditional dial-up network modems, a PSTN phone line is used to connect a device to the Internet. Internet connections via dial-up can deliver up to 56 kilobits per second. In the early days of the Internet, this was the main form of home Internet access, but with the introduction of broadband Internet networks, it became obsolete.

4.2 Switching and Routing in Hierarchy

The next critical systems are the switching hierarchy and telephone line routing. Trunk lines connect the exchanges and allow calls from different areas to be connected to the same exchange. Trunk Groups are a collection of trunk lines that connect different exchanges.

In the system of interconnecting exchanges, there are three basic topologies, such as

- Mesh Topology
- Star Topology
- Hierarchical.

- **Mesh Topology**

  Mesh topology, as the name implies, is a network that is fully connected. The number of trunk groups in a mesh network is equal to the square of the interconnected exchanges. As a result, highly populated urban environments often employ these mesh topologies.

  In the diagram below, the mesh topology is shown.

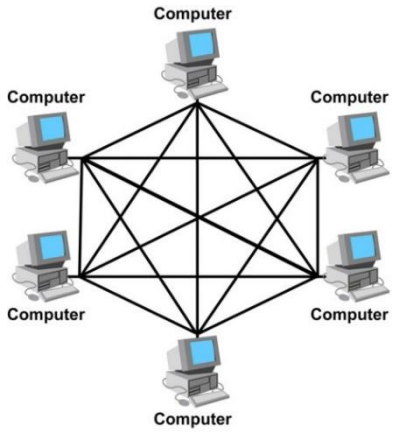


Figure 4.1: Mesh Topology

- ✓ **Star Topology**

  A star's topology is connected in the form of a star, with all other exchanges interacting via a tandem exchange, which acts as an intermediary. The diagram below shows the outline of a star network. The star network is used when traffic volumes are relatively low. External tandem interchange can link several star networks, resulting in a two-level star network like the one shown in the diagram.

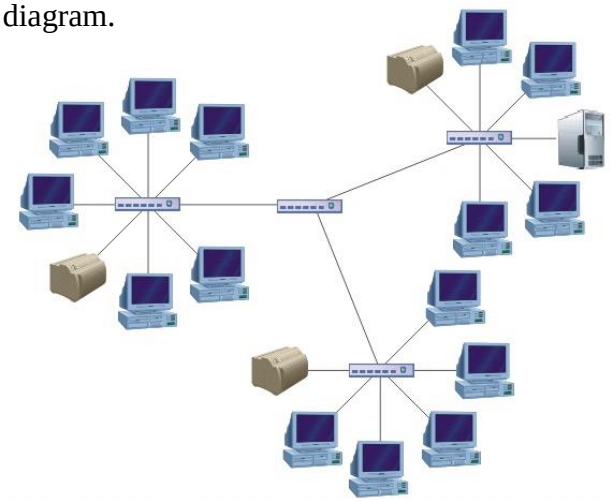


Figure 4.2: Star Topology

4.2 Switching and Routing in Hierarchy

To handle high traffic while keeping the number of trunk groups to a minimum, the hierarchical topology is used. The traffic then flows into the final direction, which is at the top of the hierarchy. If the traffic volume between two exchanges is high enough, direct trunk routes can be created, as shown by the dotted lines in the diagram below. There is a lot of traffic on these direct trunk roads. Everywhere these high-traffic roads are found, traffic flows through them. Here, overflow traffic is driven in a hierarchical manner. The use of overflow traffic from the final route is prohibited.

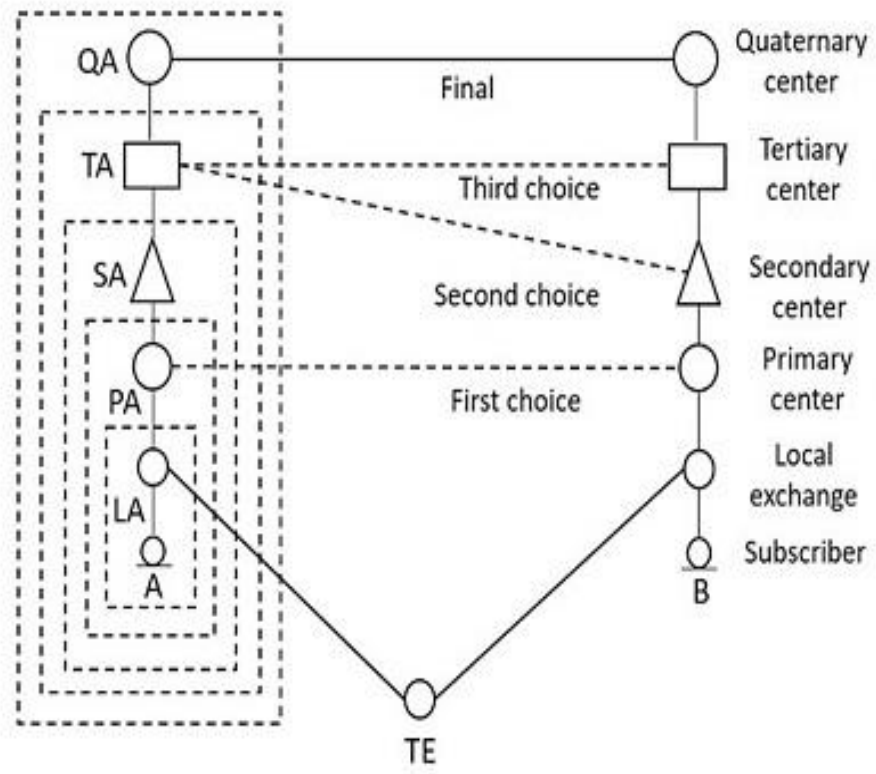


Figure 4.3: Hierarchical

To evaluate the routing on a particular connection, the following three approaches are used.

- Routing with a right-through route
- Routing through one's own exchange
- Computer-assisted routing

4.3 Plan for Transmission

To ensure successful communication, signal transmission through cables should be of high quality. The transmission links between national and international circuits should be strengthened for call establishment so that they can communicate in tandem.

To maintain high quality standards, the CCITT suggested the following recommendations-

- The In foreign calls, the maximum number of circuits that can be used is 12.
- Make a change between the start and end of international switching centers, four more international circuits cannot be used in parallel.
- Even with a small the total number of circuits, or the number of calls, may be more than 14, but the foreign circuit is still the most limited four.

In addition to the number of circuits needed, losses such as line loss or wire loss, switch loss or touch loss should be minimized. These factors are part of the transmission loss budget, which includes topics like echo reduction and singing regulation.

Because of the long distances, the circuits require amplifiers and repeaters at regular intervals to boost the signals. Where there is a mismatch between the subscriber-line interfaces, a portion of the incoming signal is reflected through the outgoing circuit and returned to the speaker as Echo. Echo suppressor or cancellation circuits are used to reduce the echo's effect. Signal attenuation and echo, in addition to contact and wire losses, are the most significant losses in transmission lines.

4.4 BTCL Numbering plan

The numbering scheme was originally limited to a single small exchange that used to connect to the other exchanges by labeling them with the names of the towns where they were located. As the number of subscribers increased, however, a slew of new exchanges sprang up.

The Main Exchange is a large central exchange that serves a town's main business district, while Satellite Exchanges serve many communities. The Multi-exchange area encompasses the main exchange's entire network as well as satellites. A common numbering scheme was needed to determine the location of the called subscriber's exchange, particularly when the call originated outside the Multi-exchange region.

The Linked Numbering System (LNS) is a common numbering scheme in which all telephone exchanges in a town are referred to as the town's name collectively. There were multi-exchange zones with the advent of subscriber trunk dialing (STD) or direct distance dialing (DDD) for

inter-city and inter-city long distance communication. Given a special id character. The International Subscriber Dialing (ISD), which created the international and national numbering plans, was introduced to allow very long-distance communications.

4.4.1 Types of Numbering Plans

In this part, we'll discuss telephone network numbering plans. Below is a summary of the proposals.

- ✓ **Make a strategy for open numbering.**

This is often referred to as the Non-Uniform Numbering Plan, and it enables a wide variety of digit counts to To find one of these customers, use this method. A multi-exchange area a nation.

- ✓ **Make preparations for a semi-open numbering system.**

For this scheme, the lengths of numbers can vary by almost one or two digits. The semi-open numbering scheme is used in India, Sweden, Switzerland, and the United Kingdom.

- ✓ **Closed numbering is a good idea.**

  This scheme, also known as the Uniform Numbering Plan, determines the number of digits in a subscriber number. France, Belgium, Canada, Hawaii, and parts of the United States are among the countries that use it.

  The CCITT has developed a World Numbering Plan, also known as an International Numbering Plan. For numbering purposes, the world is divided into regions. The arrangement of telephone numbers is depicted in the diagram below.

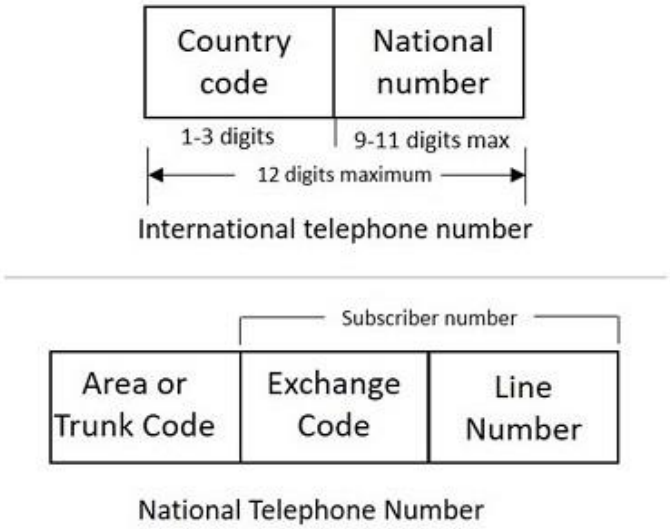


Figure 4.2: Structure of phone numbers

A national number is divided into three parts. Below is a list of the components.

- ✓ **The Area Code or Trunk Code**

  The named subscriber's special numbering area or multi-exchange area is defined by this code. This code is used to determine how a trunk call should be routed and to bill for it.

- ✓ **Code of exchange**

  Within a numbering area, this code is used to identify a specific exchange. It defines how an incoming trunk call from another numbering area should be routed, as well as a in the same numbering field, a call that originates from one exchange and is directed to another.

- ✓ **Number of follower Lines**

  It is used to choose the named subscriber thread at the end of the conversation. The follower Line number is a a variation of the exchange code and the line number of the follower in CCITT language.

4.5 Plan for Charging

Calls are paid according to the metering apparatus attached to - line of a subscriber or according to a In the event of an electronic exchange, each customer is given a metering register. A meter counts the number of charging units, and the Sending a pulse to the meter increases the count. Accusations a charge to the charging system, a bill is generated for the number of units the meter reads.

Person calls will be billed using the following definitions:

- ❖ Loading that is independent of time
- ❖ Charging is time-dependent.

Local calls are normally made within a certain number range. billed according to their length. The meter for time-based billing starts to increment when the called subscriber answers the call. Depending on the Make a call to the Exchange number listed in the Settings submenu. Multi-metering sends multiple signals to the charging meter. The metering pulse rate rises every minute due to the distance between the called and calling subscribers.

CHAPTER 05

NEXT-GENERATION NETWORK SYSTEM OVERVIEW

5.1 Next-generation network System (NGN)

Is the next generation network (NGN) a packet-based network that can deliver networks like telecommunications using a variety of Broadband, service-efficient-capable transport technology while keeping functions that are linked to services apart from the technology that underpins transportation. Users grant restricted access a wide range of service providers. It promotes generalized versatility, allowing customers to receive services in a simple and consistent manner.

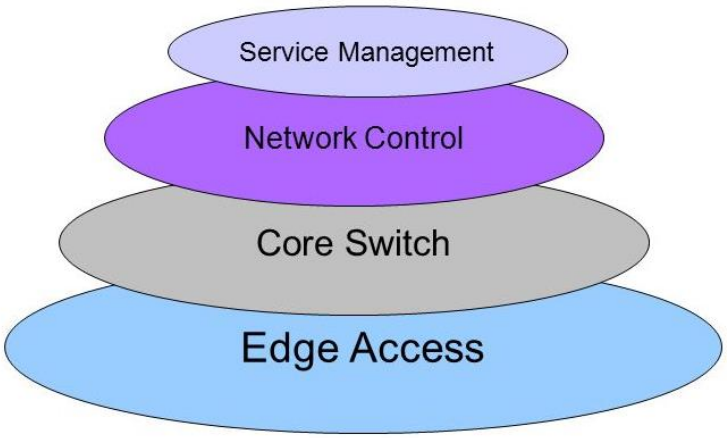


Figure 5.1: NGN System Architecture

The NGN framework is built on a four-level layer architecture. Edge access, core switching, network control, and service management are all things that need to be considered.

Functions for various layers:

- ✓ **Edge access:** The network is linked to subscribers and terminals. Knowledge is translated into a different format before it is delivered.
- ✓ **Core switching:** Equipment from the Routers and layer-3 switches are used in backbone networks and MANs. Make up the main switching layer. It makes use of packet switching technologies to give subscribers access to a standard, interconnected data transport network with high reliability, quality of service assurance, and capacity.
- ✓ **Network control:** To get immediate real-time call and link power, Network Control Level uses software switching or soft switching technology.
- ✓ **Service management:** Value-added services and organizational support are provided at the service management level.

5.2 Concept of NGN

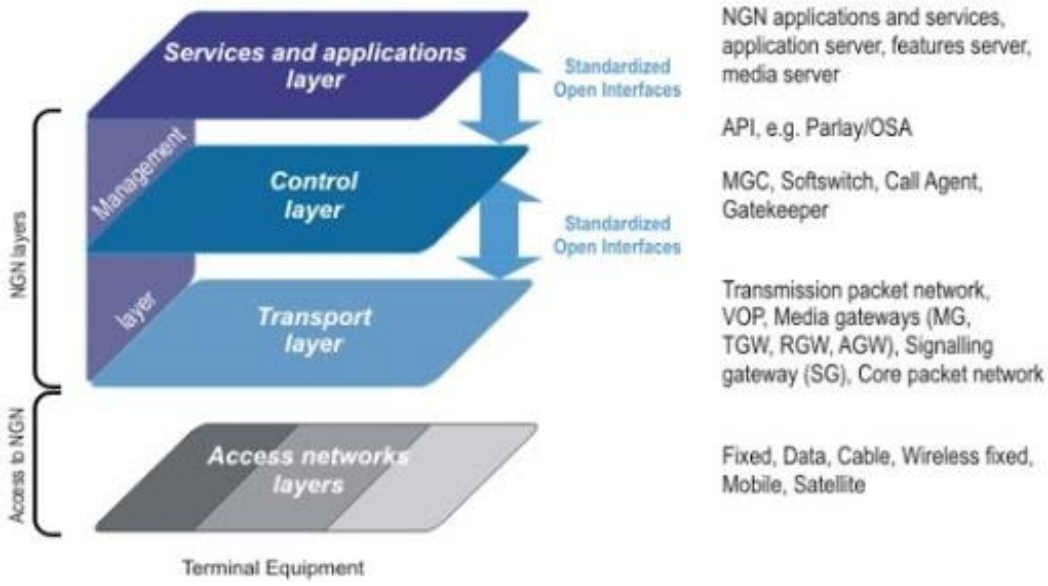


Figure 5.2: NGN conceptual model and its functional layers

The access layer: Infrastructure is given, such as a link between the end user and the transport network through an access network. The access network can be wired or wireless, and any transport media can be used.

The Transport layer: ensures data is transported between the network's individual nodes (points) and the access networks that link them. It connects all of the physical elements that have been introduced through the layers. It also transports a variety of types of traffic as well as newspapers (signaling, interactive data, real-time video, voice communication, etc.)

The Control layer: The management of services and network elements takes place here. It's in charge of starting/starting, managing, and ending the multimedia session. Depending on the service requirements, it also ensures source regulation.

The Service layer: provides the fundamental service functions that can be used to build more complex and advanced services and applications. It uses logic to keep track of the service's progress.

5.3 NGN Network Architecture

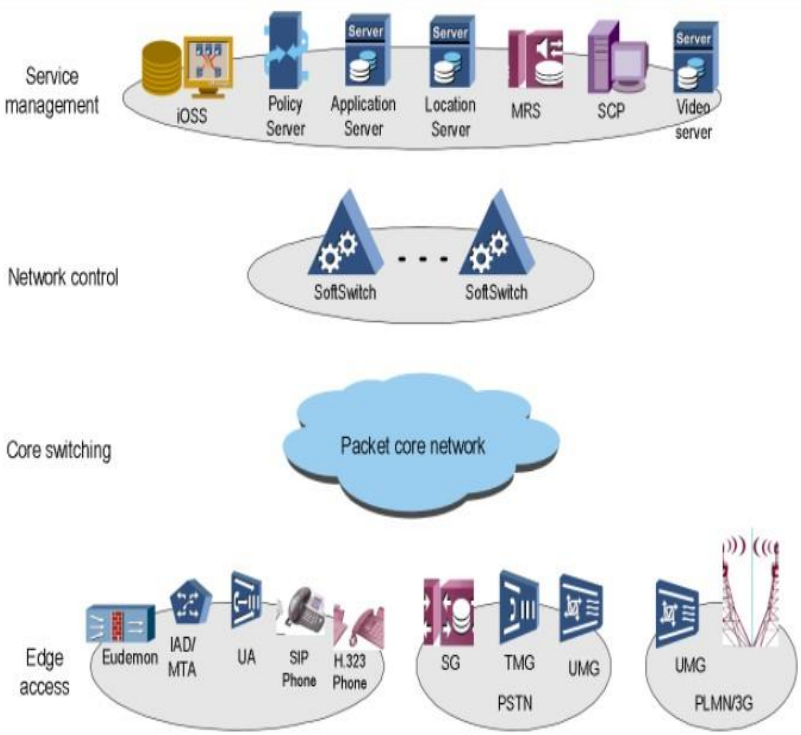


Figure 5.3: NGN Network Architecture

- ✓ **Edge access**
  - ❖ Integrated access device (IAD)
  - ❖ Media terminal adapter (MTA)
  - ❖ Universal access unit (UA)
  - ❖ SIP phone/H.323 phone
  - ❖ Signaling gateway (SG)
  - ❖ Trunk media gateway (TMG)
  - ❖ Universal media gateway (UMG)
- ✓ Service Management Layer :
  - ❖ Integrated operation support system (iOSS)
  - ❖ Policy server
  - ❖ Application server
  - ❖ Location server
  - ❖ Media resource server (MRS)
  - ❖ Service control point (SCP)

5.4 NGN Distributed System Architecture

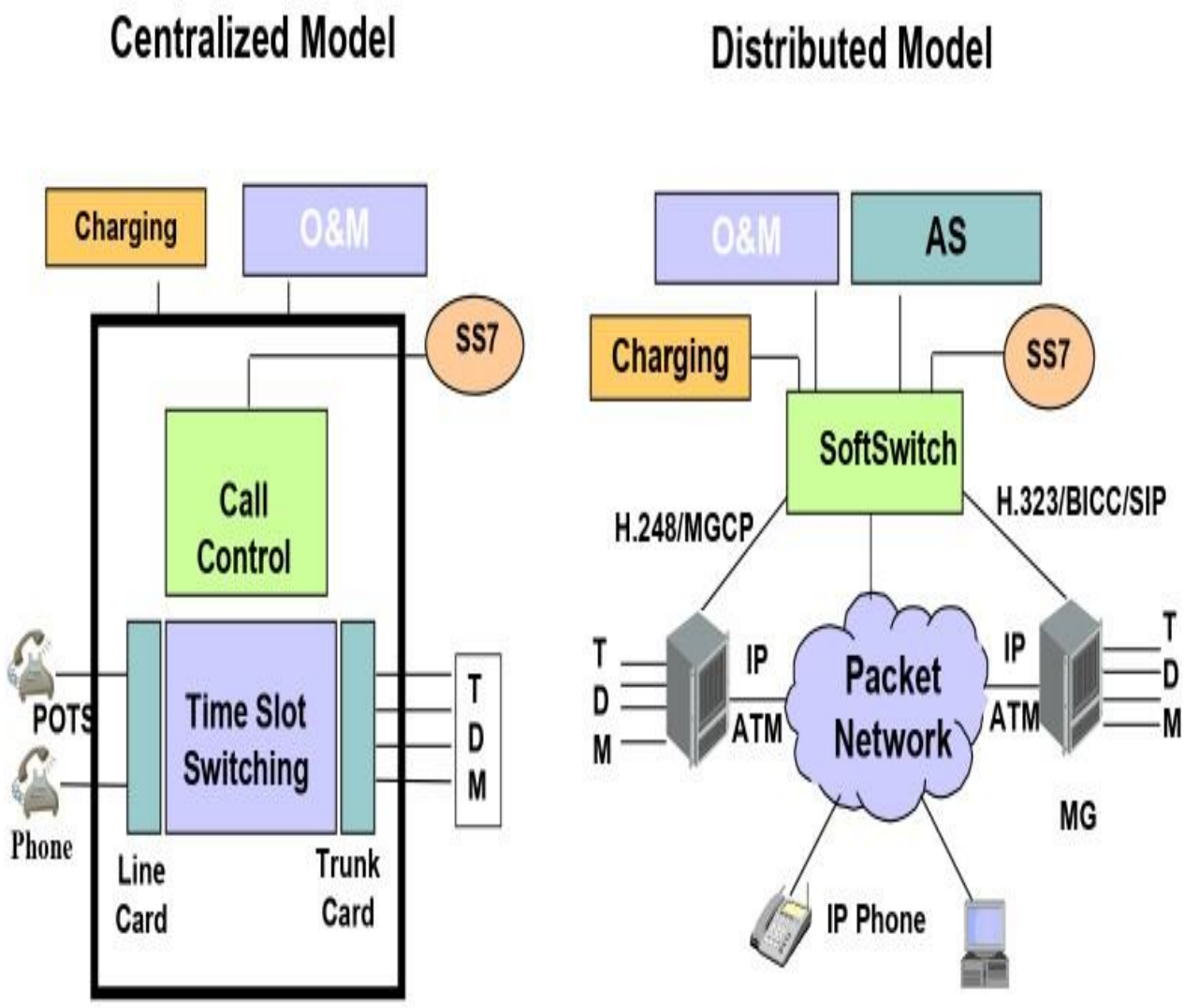


Figure 5.4: NGN Distributed System Architecture

Characteristics of Next Generation Network:

- Network architecture that is both open and distributed.
- NGN uses a hierarchical architecture that is divided into four layers: media access, transport, power, and service/application.
- Layer of network control that is self-contained.
- Gateways and internetworking
- NGN is a packet switching network that uses standard protocols.

5.5 NGN Softswitch based Architecture

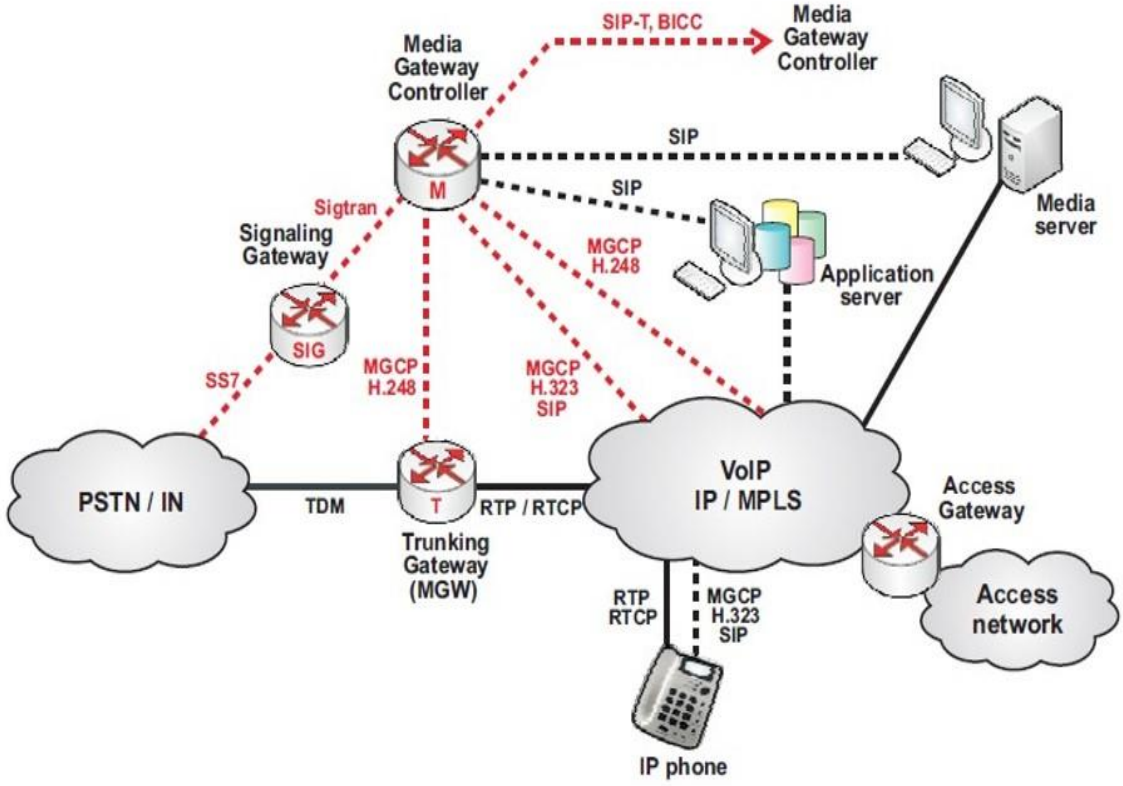


Figure 5.5: Components of Softswitch based Architecture

- ✓ **Packet based networks**
  - ❖ The new trend is to use IP-based networks instead of multiple modes of transport (ATM, SDH, WDM, etc.)
  - ❖ IP-based networks must have real-time Quality of Service (QoS) guarantees for audio, video, and multimedia.

- ✓ **Access Gateways**
  - ❖ It is essential to link subscriber lines to the packet network.
  - ❖ Converts packets from analogue access (Pots) or 2 Mb/s access interface traffic.
  - ❖ Subscribers have access to the NGN network and services.

- ✓ **Trunking Gateways**
  - ❖ Allows packet-based NGN networks and conventional TDM telephony networks to communicate with one another.

- Data packets are converted from TDM circuits/trunks (64kbps) and vice versa.

✓ **Application Server (AS)**

- A unit that helps with service execution, such as managing Call Servers and NGN special tools (e.g. media server, message server).

✓ **Softswitch/MGC**

- Referred to as the Call Agent or Media Gateway Controller (MGC).
- Inside the network, "service delivery control" is available.
- This person is in charge of Call Control and Media Gateway Control (Access and/or Trunking) through the H.248 protocol.
- Performs signaling gateway features or uses a signaling gateway for interworking with the PSTN N7 signaling network.
- Connects to Intelligent Network/Applications servers to provide TDM users with the same services.

CHAPTER 06
TELECOM STRUCTURE OF BANGLADESH

6.1 International Gateway (IGW)

A Foreign Gateway is a phone number that is used to route calls to receive lower international long-distance rates or to make international calls over voice over IP (VOIP) networks. They may also be used to make an international call to the US appear to come from a local number rather than the actual location.

Scammers and con artists of all sorts use them all the time, from international fraudsters to lottery fraud to fake money order overpayment fraud, and they have a range of legitimate uses. In some cases, the caller ID will display INTL GATEWAY, and in others, it will display anonymous or unknown. The number will still appear to be disconnected when you call it again. Unknown phone numbers can be looked up on a variety of websites on the Internet.

Operators of International Gateways (IGW):

1. Tech Panacea
2. Mir Telecom LTD
3. 1Asia Alliance Gateway
4. Bangladesh International Gateway
5. Bangla Tel Ltd
6. Bangla Trac Communications
7. Bestec Telecom
8. BG Tel
9. BTCL
10. Cel Telecom

6.2 Interconnection Exchange (ICX)

The “Interconnection Exchange (ICX)” is a switching mechanism that enables operators to link their telecommunication networks, enabling tracking, lawful interception (LI), and roaming number portability.

- ✓ The number of ICX operators will be determined by the government based on the needs of Bangladesh's telecommunications industry.

- ✓ The ICXs will be located primarily in Dhaka. More ICX will be deployed in other locations based on traffic demand, allowing more rural people to connect to the network if required.
- ✓ ICXs will have key backbone links to overseas networks through the ILDC network.
- ✓ Physically, IGWs and ICXs will be connected. ICXs will build and maintain interconnection facilities to link IGWs to ICXs and ICXs to ANS operators through their POPs.

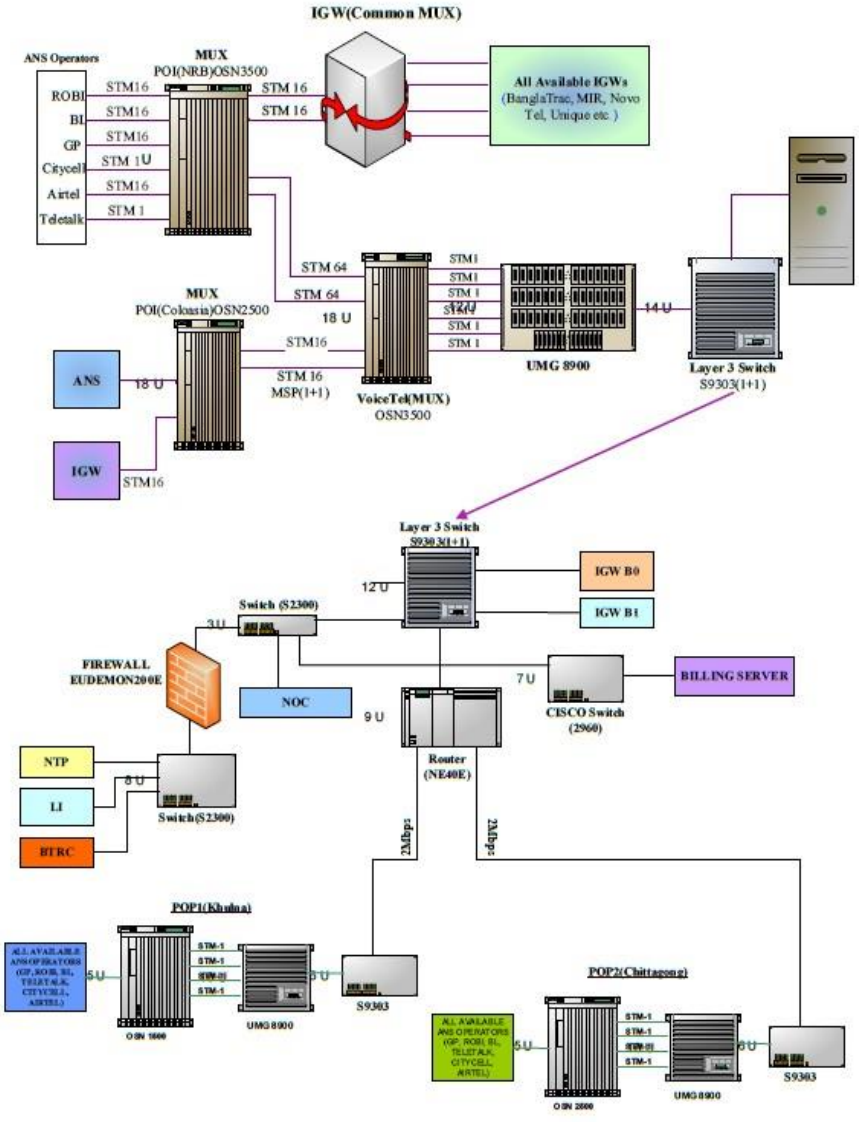


Figure 6.1: Overall Architecture of ICX

Operators of the Interconnection Exchange (ICX)

1. M & H Telecom LTD
2. Jibondhara Solutions Ltd.
3. Summit ICX
4. BTCL
5. Bangla ICX Ltd.
6. Agni ICX
7. Apex Communication Pvt Ltd
8. CloudTel
9. GAZI Networks Ltd
10. GETCO ICX

6.3 International Internet Gateway (IIG)

Some of Bangladesh's largest International Internet Gateway (IIG) service providers include BSCCL (SMW4, SMW5), BTTB, Tata Communications Limited, Bharti Airtel Limited, Singapore Telecommunications Limited, COGENT, NTT, HURRICANE, and TIS. Via international IPLC services, we also have IX connectivity with Equinix and SGIX in Singapore, as well as Mumbai-IX in India. Consumer satisfaction and regional penetration have also increased as a result of this initiative. Our prestigious international networks provide our clients with global IP coverage and integration capabilities across North America, Europe, and Asia-Pacific. Despite having the largest PoP presence in cities and around the world, as well as an integrated network with global partners, our networks are fully redundant with approximately 99.99 percent uptime. SComm has already installed rld class (1+1) infrastructure systems and services for customers on the IIG network.

International Internet Gateway (IIG) operators

1. Aamra Companies
2. 1Asia Alliance Communication
3. Abir Telecommunication
4. Apple Communication
5. Bangla Phone Ltd
6. bdHUB
7. BD Link Communication Ltd
8. BSCCL
9. BTCL
10. Cybergate

6.4 Internet Services

In 1996, Bangladesh got connected with the internet. Despite being a little late, recent years have seen a dramatic growth. The high internet tariff imposed by the government is stifling the sector's growth. Recently, the government decided to reduce tariffs by half.

The internet country code for Bangladesh is.bd.

There were over 180 Internet Service Providers in the area in 2005. Internet service providers are controlled by Bangladesh's telecommunication regulatory commission (BTRC).

In March 2009, Bangladesh had over 600,000 internet users, up from 100,000 in 2000. However, only 0.3 percent of the population uses the internet, making Bangladesh the country with the world's lowest internet usage rate per population, ahead of North Korea, Myanmar, and Sierra Leone.

In April 2010, Akhtaruzzaman Manju, president of the Bangladesh Internet Service Providers' Association, told Xinhua that the country's six cell phone operators and Internet Service Providers had provided over 800,000 internet connections. "We estimate that nearly 10 million people share 800,000 internet connections around the world," he said, adding that the country's internet users are rising at a rate of 15–16 percent per year.

According to a 2009 study by the Boston Consulting Group, by 2020, Bangladesh will have 18.3 million Internet users, or 32 percent household Internet penetration, resulting in a 2.6 percent contribution to GDP and the development of 129,000 new jobs.

6.4.1 BTCL Internet Services

With dial-up Internet access accessible in all 64 districts, BTCL is the world's most widely available Internet service provider. As of January 2009, it had 32,433 dial-up subscribers. Since the beginning of 2007, BTCL has been upgrading its dial-up Internet service in order to improve customer loyalty. The.bd domain is also under its control.

BTCL provides consumer-level broadband Internet services under the BCUBE name. The service is delivered using ADSL2+ technology. BCUBE delivery and customer service have been taken over by EMEM Systems Ltd, System & Services Ltd (SSL), and Sis view Technologies Ltd. BTCL currently has over 15,000 customers. BTCL earns about Tk19, 000,000 per month from this operation.

6.5 Satellites

Bangladesh's first satellite in space will have 40 telecommunications and broadcasting transponders.The satellite's two ground stations will be built on Bangladesh Telecommunications Company Limited land in Joydebpur, Gazipur, and Betbunia,

Rangamati (BTCL). The satellite, which will be named after Bangabandhu Sheikh Mujibur Rahman, the Father of the Nation, will be launched into space in June 2017.

6.6 International Terrestrial Cable (ITC)

Summit Communications Limited is a major International Terrestrial Cable (ITC) service provider in Bangladesh, with one-fifth of the country's total bandwidth. By maintaining 99.99 percent uptime, SComm has earned one of the highest positions in Bangladesh's telecommunications sector as an ITC operator.

SComm has established close relationships with Tata Communications Limited and Bharti Airtel to provide bandwidth over a variety of submarine cables, including the I2I, IMEWE, TIC, TGN-EA, SMW3 and SMW4. SComm - ITC maintains tertiary level redundancy in the terrestrial route with a disaster response centre to provide the best experience to its customers.

SComm ITC offers seamless services to its customers not only in the domestic but also in the international NLD industry, with lower latency and uptime. SComm also offers a 99.99 percent end-to-end network uptime guarantee, which sets it apart from other Bangladeshi service providers.

International Terrestrial Cable (ITC) operator

i. Asia Alliance Communication
ii. BD Link Communication Ltd
iii. Fiber @ Home
iv. Mango Teleservices
v. NovoCom
vi. Summit Communications

6.7 Mobile operators

There are six mobile phone companies in Bangladesh. In April 2015, Bangladesh's mobile phone subscribers rose to 124.705 million, up from 45.21 million in February 2009.

Table 6.1: All of mobile operator list

Teletalk Bangladesh Ltd. (Teletalk)
Grameen Phone Ltd. (GP)
Orascom Telecom Bangladesh Limited (Banglalink)
Robi Axiata Limited (Robi)
Airtel Bangladesh Limited (Airtel)

Following an open auction, the Bangladesh Telecommunications Regulatory Commission assigned six companies licenses for two Interconnection Exchanges (ICX), three International Gateways (IGW), and one International Internet Gateway (IIG) on February 25, 2008.The same licenses were also issued to the incumbent BTTB. Following that, on April 12, 2012, the Bangladesh Telecommunications Regulatory Commission granted licenses to twenty-one Interconnection Exchanges (ICX), twenty-two International Gateways (IGW), and thirty International Internet Gateways. (IIG) International Institute for Globalization All of the operators are mentioned below.

6.8 Submarine cables

Bangladesh Submarine Cable Company Limited (BSCCL) is a Bangladesh-based telecommunications and international submarine cable operator. It's also a member of the IIG (International Internet Gateway). BSCCL's service represents long-distance accessibility between Bangladesh and the rest of the world. The Corporation was launched in July 2008 as a public limited company under the Posts and Telecommunications Division of the Government of Bangladesh's Ministry of Posts, Telecommunications, and Information Technology. The SMW-4 and SMW-5 consortiums, which have more capacity and redundancy in Bangladesh's submarine cables, are members of BSCCL. The BSCCL-IIG is assisting people in accessing wireless Internet at a lower cost and with a higher degree of availability. BSCCL is one of Bangladesh's quickest-growing telecommunications companies. It is a leader in Bangladesh when it comes to introducing national ILDTS and ICT policies in order to establish modern tele-networks and high-speed Broadband Internet. The submarine cable network, with BSCCL playing a key role, is expected to be the main telecommunications backbone for "Digital Bangladesh" by 2021. By providing high-speed fiber optic submarine cable bandwidth and cutting-edge Internet Transit facilities, BSCCL effectively connects users to the "Information Super Highway."

During the visit of Honorable Prime Minister of India, Shri Narendra Modi, to Bangladesh on June 6, 2015, the Managing Director of BSCCL and BSNL signed a 10Gbps IP bandwidth export agreement for Tripura State, India, in the presence of Honorable Prime Ministers of India and Bangladesh. The Honorable Prime Ministers of India and Bangladesh launched the program via video conferencing on March 23, 2016.

In 2014, the Bangladesh Submarine Cable Company signed an agreement with the SMW-5 Consortium to ensure control of the country's second submarine cable, which was inaugurated via video conferencing on September 10, 2017 by Bangladesh's Honorable Prime Minister, Sheikh Hasina.

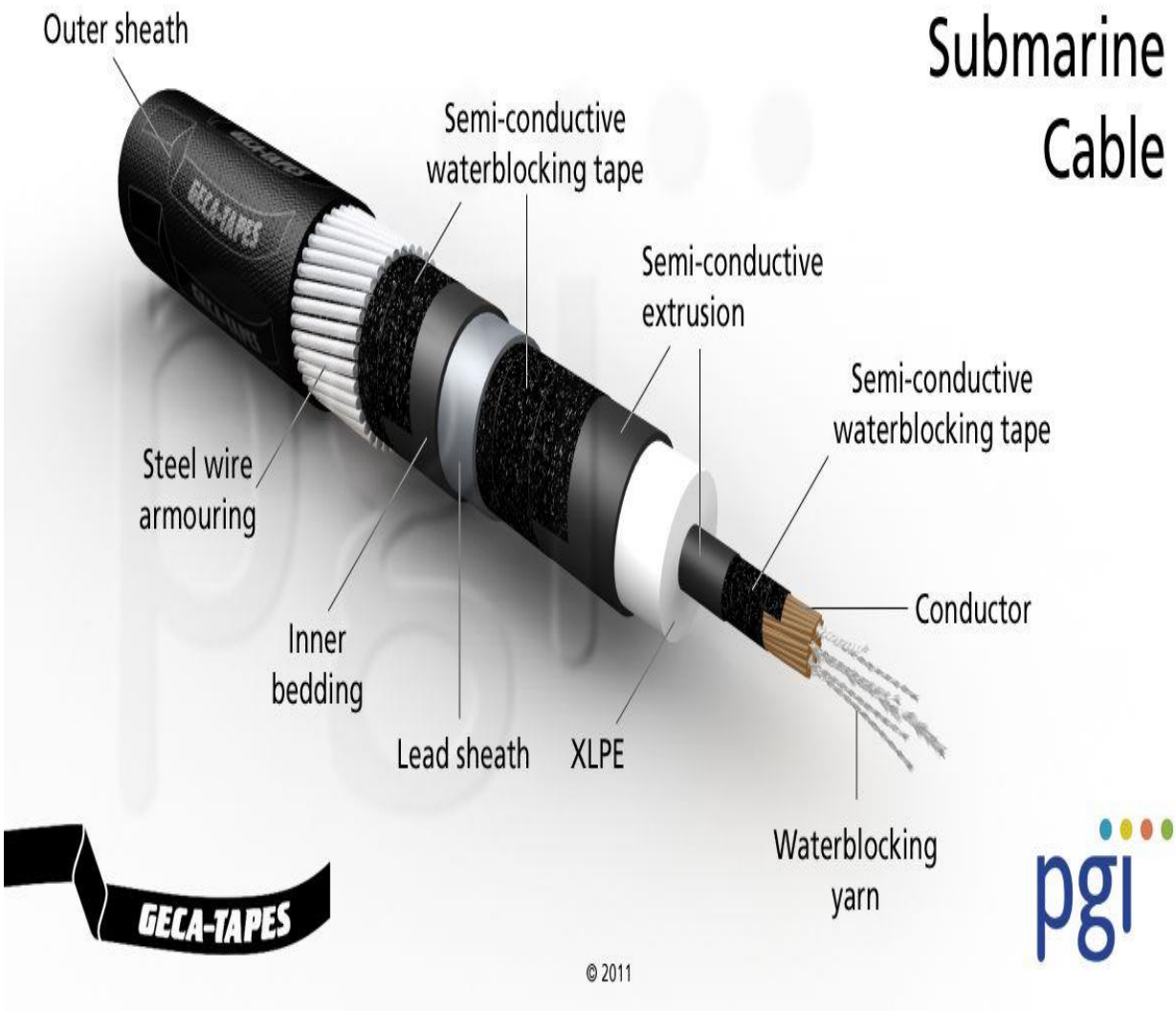


Figure 6.2: submarine cable

CHAPTER 07

POWER, AIR-CONDITION AND ALARMS FACILITIES

7.1 Switchroom Management

For the Switching system's operation, the offer must include all necessary power and air-conditioning equipment. The facilities for those power plants are listed below. BTCL makes use of two different forms of electricity.

7.1.1 Alternating Current (AC)

Direct current is used in the telephone. These two wires provide DC current to power the telephone circuitry, AC current to ring the telephone bell or electronic ringer, and a full duplex balanced voice path. This is a balanced closed loop system that is not linked to the outside world. The voltage should be about 48 volts DC when both phones are connected to the POTS line.

Rectifier

The rectifier modules needed to operate the system and charge the backup batteries with DC power must be included in the offer. The Bidder must include his DC power specifications as well as the backup battery charging current at a 10 hour charging period in his offer. It is essential to use electronic switch-mode rectifiers with automatic redundancy and charging control functions. The control panel must have visual and audible alarm facilities, as well as required alarm loops, in order to exchange OMM.

Inverter

The contract must include the required DC to AC inverter modules for supplying AC power to any equipment that needs it. The backup battery will serve as a power source. It is essential to use electronic switch-mode inverters with automatic redundancy control functions. The control panel must have visual and audible alarm facilities, as well as required alarm loops, in order to exchange OMM.

7.1.2 Direct Current (DC)

Battery

The bid must include the required battery sets, as well as a backup DC power source, to keep the system running at SHER-E-BANGLA if the AC power fails. The Bidder must use the thorough rundown of his DC power specifications that he submitted in his bid offer in his bid offer. Each battery set must have two separate circuit breakers with sufficient capacity (one at the rectifier end and the other at the battery end), enabling complete disconnection of the battery set during any required O&M function.

Generator

For backup control, BTCL uses a generator. Even if the battery is not fully charged, the generator provides power supply when the alternating current is no longer available. In other words, no energy should be lost in some way.

7.1.3 Air-Condition

The winning bid must provide an air conditioning unit for the trade as well as OMC rooms. In his or her offer, the Bidder must provide a comprehensive list of the air-conditioning system specifications. The current power demand of the air-conditioning unit is measured using the parameters mentioned below. A single control unit for the air conditioning system must perform all of the necessary control and monitoring functions. The control panel must have visual and audible alarm facilities, as well as required alarm loops, in order to exchange OMM.

7.1.4 Temperature Alarms

The ICT market is currently expanding at a breakneck rate. In this sector, sensitive components in host rooms, transfer rooms, and other essential equipment must be monitored on a regular basis. Temperature control is an essential part of this method. Each of these vital infrastructures must operate at a specific temperature, and even a small temperature difference may cause daily operations to fail. The temperature of these infrastructures must also be monitored on a regular basis, which necessitates the use of dedicated manpower. It is, however, not cost-effective, and human monitoring is not without flaws. As a result, installing an electronic device that can continuously monitor the temperature and warn concerned parties at any time is the safest alternative. As a result, a temperature control and warning system is now available online.

Temperature Monitoring and Alerting System in the Cloud (OTMAS)

The Online Temperature Monitoring and Alert System is a built-in Internet of Things (IoT) system that takes temperature as an input from a sensor and sends it as an output to a specified location through SMS or a web portal. The purpose of this embedded Internet of Things device is to monitor temperature in server rooms, switch rooms, and other temperature-sensitive infrastructure where machinery generates a lot of heat. The temperature is normally regulated by air conditioning. If the air conditioning system fails, however, the temperature will rapidly rise, potentially damaging sensitive equipment and posing a fire

hazard. OTNAS is a low-cost solution that regulates temperature and alerts required personnel, saving time and money while reducing the risk of injury.

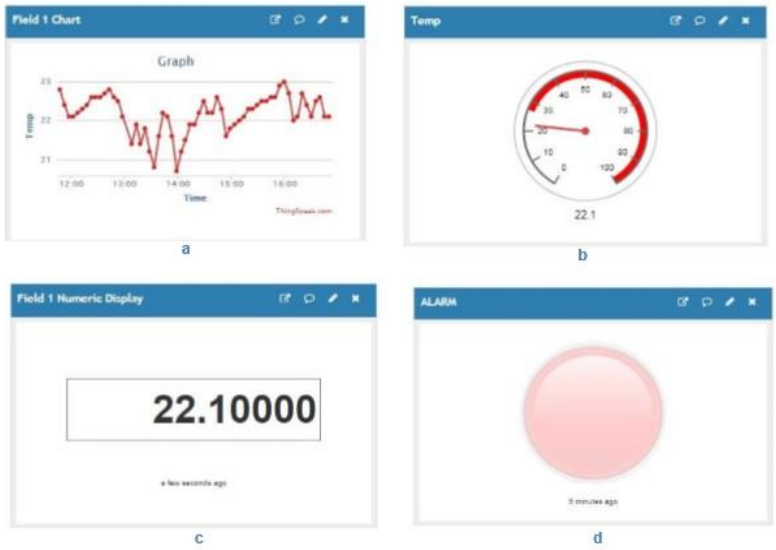


Figure 7.1: (a) Temperature Graphical Representation with Time in Switch-1 171KL Switch Room; (b) A Continuous Temperature Meter with a Critical Temperature Setting; (c) Temperature in Numerical Form; (d) Alert Light for High Temperatures

Figure 7.2: Regular Temperature Notification of OTMAS via SMS

CHAPTER 08
CONCLUSION AND FUTURE CAREER

8.1 Conclusions of the Discussion

The task of conducting research and discovery on telecommunications operations, a dynamic and critical feature of the telecom industry, is huge, competitive, professional, and time-consuming, requiring keen observation skills, quick learning abilities, enhanced analytical skills, and so on. As a result, I am ecstatic and relieved to have completed and recorded my internship experience in a supportive environment on this highly regarded Telecommunications subject. The grace of God, the teachings of my respected educators from Daffodil International University, and the guidance of the BTCL Sher-e-Bangla Exchange Switch Division all contributed to my achievement. Family and friends' love, and, last but not least, my own best efforts and constructive hard work. Given my dedication and integrity, I would appreciate it if this internship thesis on the BTCL Telecommunications System were accepted in a positive and welcoming manner.

Despite the fact that I was offered a great learning opportunity during my internship. The most serious problem was a lack of time. Another explanation was the company's code of ethics, which prohibited employees from giving me more in-depth information. They were hampered by the need to maintain corporate confidentiality and secrecy. It should be noted that working for any Telecom-based corporation needs employees to be not only acquainted with, but also experienced with the technology used in the organization's online operations. To meet this criterion, every employee in the Telecom division goes through extensive training. They were kind enough to provide me with basic Telecom network operations training. And, despite the fact that I only had a finite amount of time to complete my internship, this significantly improved my understanding of networking activities.

8.2 Possibilities for a Future Career

My internship at Bangladesh Telecommunications Company Limited has been extremely enriching and beneficial for me as a student pursuing a highly regarded degree in Computer Science and Engineering, allowing me to engage in critical and resourceful practical tasks while putting my theoretical skills to good use. By the immensely talented and well-respected faculty members of my favorite educational institute, Daffodil International University. My honorable boss, in particular, has helped me conquer any obstacles I've encountered during my internship. As a result, I am grateful to my esteemed teachers for providing me with a solid educational foundation, as well as Bangladesh Telecommunications Company Limited (BTCL) for providing me with a realistic area in which to hone my telecommunication skills. As a result, I am pleased to regard this internship as a turning point in my development as a good practitioner. My degree from my beloved university served as the cornerstone for this project.

Submission date: 01-May-2021 03:40PM (UTC+0600)

Submission ID: 1575229484

File name: 2-15-11521_Bangladesh_Telecommunications_Company_Limited_7.docx (1.28M)
Word count: 7386

Character count: 40354

BTCL: The Foundation of Bangladesh's Telecommunication Network

ORIGINALITY REPORT

23%	20%	2%	12%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPE

PRIMARY SOURCES

1	en.wikipedia.org Internet Source	8%
2	Submitted to Bangladesh University of Professionals Student Paper	3%
3	Submitted to Daffodil International University Student Paper	2%
4	www.bsccl.com Internet Source	2%
5	www.summitcommunications.net Internet Source	1%
6	Submitted to American University of the Middle East Student Paper	1%
7	improvet.cvut.cz Internet Source	1%
8	Submitted to American University of Beirut Student Paper	1%

9	66.102.9.104 Internet Source	1%
10	www.jkaudio.com Internet Source	<1%
11	Submitted to London School of Commerce - Dhaka Student Paper	<1%
12	Submitted to Colorado State University, Global Campus Student Paper	<1%
13	lawyersnjurists.com Internet Source	<1%
14	www.coursehero.com Internet Source	<1%
15	Submitted to University of South Alabama Student Paper	<1%
16	zh.scribd.com Internet Source	<1%
17	Submitted to Midlands State University Student Paper	<1%
18	Submitted to The Chicago School of Professional Psychology Student Paper	<1%
19	estia.hua.gr Internet Source	<1%

20	www.ajbssit.net.au Internet Source	<1%
21	collegegirlwebcams-cg.blogspot.com Internet Source	<1%
22	dspace.ewubd.edu Internet Source	<1%
23	medlibrary.org Internet Source	<1%
24	A. J.M. SHAFIUL ALAM BHUIYAN. "The political economy of moss communication in Bangladesh", Journal of International Communication, 2002 Publication	<1%
25	dspace.daffodilvarsity.edu.bd:8080 Internet Source	<1%
26	id.scribd.com Internet Source	<1%
27	www.slideshare.net Internet Source	<1%
28	Sadik Hasan. "ICT Policies and their Role in Governance: The Case of Bangladesh", Science, Technology and Society, 2014 Publication	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		