Internship on Network and Technical Support System

BY

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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 project, titled **"Internship on Network and Technical Support System,"** submitted by Kanak Chandra Sarker 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 date 16th July 2024.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision of **Md. Sazzadur Ahamed, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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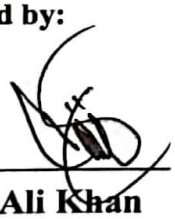

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I express my sincere gratitude and desire to Md. Sazzadur Ahamed, Assistant Professor, CSE Department, Daffodil International University, Dhaka, on behalf of our entire family. To complete this assignment, our supervisor must have deep knowledge of and a strong interest in the subject of "Internship on Network and Technical Support System." The completion of this project has been made possible by his unending patience, academic guidance, ongoing encouragement, persistent and vigorous supervision, constructive criticism, insightful counsel, and his reading of several subpar drafts and correction of them at every level.

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We would like to thank our entire course mate in Daffodil International University, who took part in this discuss while completing the course work.

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

ABSTRACT

An extensive summary of my internship at [K.M Hasan & Co]'s Network and Technical Support System department is provided in this report. Through the internship, I gained practical experience in a range of network administration and technical support activities and developed a greater grasp of the IT infrastructure. Gaining expertise in network design and configuration, comprehending the troubleshooting procedure, and offering effective technical help to end customers were the main goals of the internship. I was involved in a number of important tasks during my internship, including maintaining security protocols, setting network devices, keeping an eye on network performance, and resolving user-reported technical concerns.

The report outlines certain tasks completed during the internship, such as putting in place a network monitoring system, setting up a secure wireless network, and carrying out a strategy to update the network. It also covers the technology and tools used, including several operating systems, network monitoring programs like Nagios and Wireshark, and Cisco switches and routers. The difficulties faced throughout the internship are also looked at, including handling urgent assistance requests and identifying complicated network problems. The methods used to get beyond these obstacles and the knowledge gained from them are explained in depth.

My technical proficiency, problem-solving skills, and comprehension of network and technical support systems have all greatly improved as a result of the internship. It also offered insightful information on how crucial teamwork and efficient communication are in a technical support setting. To sum up, the internship was a crucial learning opportunity that enhanced my technical expertise and equipped me for a future in network administration and technical assistance. I have no doubt that the knowledge and expertise I've obtained over this time will help me succeed professionally in the IT industry.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This report describes the internship that was undertaken from [start date] to [end date] at [K.M. Hasan & Co] in the Network and Technical Support System department. The internship was created to close the gap between academic understanding and practical application by giving participants hands-on experience with the foundational elements of network administration and technical assistance. Gaining practical experience with network devices and support systems, improving technical troubleshooting abilities, and gaining a firm grasp of network infrastructure were the main objectives of the internship. Throughout my internship, I performed a range of duties that helped the company's IT systems run smoothly while working under the direction of knowledgeable network engineers and technical support personnel.

The key areas of concentration were:

- Network Setup and Configuration
- Network monitoring and maintenance
- Technical support
- Security management

1.2 Motivation

I am now enrolled in the Computer Science Engineering degree at DIU. Bangladesh has a large event space for information technology, which allows me to gain practical experience to develop my IT abilities and increase my chances of finding work. CCNA is a system that helps me build relationships and achieve my goals. With my CCNA qualification, I chose to accept a temporary employment as a network administrator. This position demands me to have strong communication skills, problem-solving talents, and the ability to grasp technical concepts. My employers expect me to deliver exceptional management and problem-solving skills.

1.3 Internship Objectives

Internships are important for both our future employment and personal life. I have finished the CCNA Functional Analysis training course., which aimed to prepare me for a career in IT by providing structured work and practice opportunities. This program provides an excellent chance for me to gain experience and grow professionally. During my internship, I learned several new things that will prove useful in my future corporate job. This traineeship program is designed to allow students to gain practical work experience while still pursuing their academic studies, thus integrating professional development with their educational pursuits.

1.4 Introduction to the Company

The internship is performed under K. M. Hasan & Co, a Chartered Accounting firm, whose services range from Taxation, VAT, Auditing, Company matters, and more. There are around 200 students and employees working for the company. Even though it is a Chartered Accounting firm, there is a great deal of focus on IT automation and usage. I worked for the IT department that monitors and facilitates all networking and system support issues for the company.

Figure 1.4.1: Company Picture

Figure 1.4.2: Company Picture

Figure 1.4.3: Company Picture

CHAPTER 2

ORGANIZATION

2.1 Introduction

The entire internship is completed under K. M. Hasan & Co., a Chartered Accounting firm, whose services range from Taxation, VAT, Auditing, Company matters, and more. There are around 200 students and employees working for the company. Even though it is a Chartered Accounting firm, there is a great deal of focus on IT automation and usage. I worked for the IT department that monitors and facilitates all networking and system support issues for the company.

2.2 Situation of the Product and Market

Audit and Assurance Service

- Statutory/ Annual Audit
- Special Purpose Audit/ Review
- Reviewed by Certified Accountant
- Interim Review & Internal Audit
- Internal Control under Coso Framework
- Operational Audit
- Performances and Compliances Audit
- Forensic Audit

Taxation Service

- Corporate Tax
- Personal Tax
- Value Added Tax (VAT)
- Tax Advisory & Tax Compliance
- Tax Due Diligence
- Transfer Pricing Review

2.3 SWOT Evaluation

- Strong communication skills are an asset.
- A good standing within the outstanding coach business.
- Having too little experience is a drawback.
- Not enough resources.
- Insufficient advertising.
- Possibilities: Teach a varied set of people.
- Train a diverse group of individuals.
- Serve as an educator.
- Threats: Their inability to expand their institute and training facilities is due to financial constraints.

CHAPTER 3

ACTIVITIES, EVENTS, AND TASK

3.1 Daily Activities and Tasks

Three months of my internship in the K.M. Hasan & Co, I have gained and exercise the following topics properly:

- **Basic Network**
  - OSI & TCP/IP Model
  - IP Addressing & Sub-netting
  - Heatmap Depiction
  - protocol Information.
- **Network Design and Implementation**: Communicate with ISP about company requirement and setting up Network Infrastructure Configure network hardware (Router, Switch).
- Installing Network software and Ensure Compatibility with existing system.
- Mac Binding and Mac removing of Clients device.
- **Troubleshooting:** Troubleshoot the Network Infrastructure in case of any Network Problem Occurs.
- **Queuing Speed:** Queuing the Internet speed of different clients according to company policy.
- **Network Monitoring:** Monitor the performance of the whole network system and Internet traffic and promptly addressing any issues or disruptions.
- **Hardware and Software Upgrades:** Upgrading network hardware and software and maintaining their functionality.
- **Documentation:** Documenting network configurations, changes, and solutions to problems.
- **Network Security:** Ensuring the security of the network to protect it from hacking, viruses, and other security threats.

CHAPTER 4

BACKGROUND KNOWLEDGE

An entry-level certification that Cisco offers to IT workers is the Cisco Certified Network Associate (CCNA). With this credential, you can demonstrate that you have the abilities needed to design and validate wide-area network (WAN) connections to distant locations in addition to managing, expanding, and troubleshooting medium-sized switched and routed networks. Having passed the 200-120 CCNA composite test, one can become a Cisco Certified Network Associate. A small to medium-sized corporate branch network's configuration, operation, and troubleshooting skills are assessed in this test. A wide range of topics are covered in the exam, such as WAN technologies, network security implementation, network types and media, TCP/IP and OSI models, IP address assignment, IOS device operation and configuration, VLANs for expanded switched networks, IP path verification, the routing and switching basic concepts, direct connection setup, and access.

4.1 Router Cisco

Routers are networking devices that utilize multiple packet-switched networks or subnetworks and manage the exchange of data packets and IP addresses. With routers, it is possible for several devices to share a single internet connection.

Figure 4.1.1: Cisco Router

4.2 Switch Cisco

Cisco switches are essential parts of contemporary networking systems. They offer vital connection and traffic control in a variety of network configurations, from cramped office spaces to large business settings. Cisco, a top producer of networking gear, provides a wide selection of switch types, ranging from simple unmanaged switches to sophisticated, highly programmable managed switches, to satisfy a variety of networking requirements.

Figure 4.2.1: Cisco Switch

4.3 Cisco Hub

A hub is a device that allows multiple computers and devices to connect to a local area network (LAN) through a centralized point. It works by broadcasting data to all connected devices through Ethernet-based technology. In other words, a hub creates a logical bus where all connected devices share the same communication channel.

Figure 4.3.1: Cisco Hub

4.4 Optical Fiber Cable

Optical fiber cables are essential for transmitting data signals over long distances using light pulses, replacing traditional copper wire-based systems. They connect network devices like routers, switches, servers, and end-user devices, enabling high-speed data transmission and are crucial for modern networking technologies like the internet, LANs, WANs, and MANs.

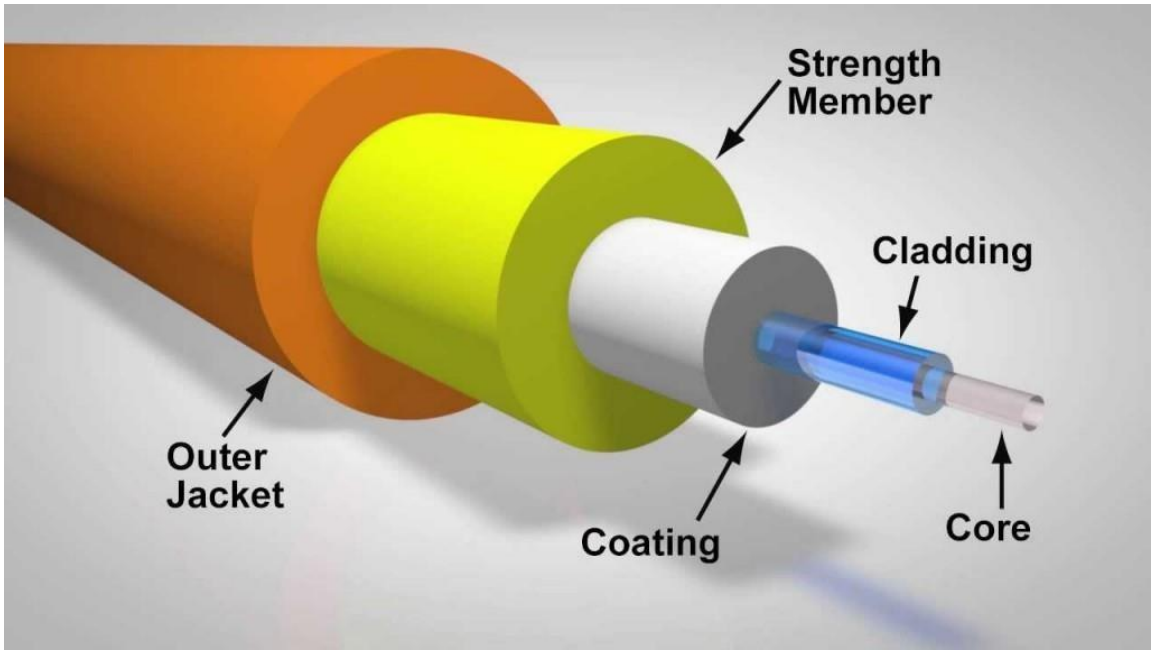

Figure 4.4.1: Optical Fiber Cable

4.5 Twisted Pair Cable

An electrical cable known as a "twisted pair" is made up of two pairs of insulated copper wires that have been twisted together. It's one of the most often utilized cable kinds in telecommunications systems and local area networks (LANs) for device connections. Unshielded twisted pair (UTP) and shielded twisted pair (STP) are the two primary types of twisted pair cables.

Figure 4.5.1: Twisted pair Cable

4.6 The Definition of a Network

A network is an assembly of systems and devices that are connected to one another and intended to exchange information and resources. In addition to software and services, these devices may consist of PCs, servers, routers, switches, printers, and other hardware. Devices in a network are linked together by communication channels, which might be wireless, physical wires, or a mix of the two. A network's main function is to facilitate the transfer of data, information, and resources across linked devices so they may work together, share files, printers, and internet connections, among other shared resources.

Every network has the following components:

- At least two workstation PCs, either for clients or servers.
- NICs, or network interface cards:
- A route for communication that is sometimes wireless but usually wired Computers and other networked devices can communicate with one another.

4.7 Network Associations

The following network types are quite common:

- LAN stands for Local Area Network.
- WAN stands for Wide Area Network.
- The network of metropolitan areas (MAN).
- PAN stands for Personal Area Network.

1. LAN stands for Local Area Network

A local area network, or LAN, is a network that covers a comparatively limited area, such a single school, building, or office. Ethernet cables or Wi-Fi connections are commonly used in LANs to link devices located in the same physical area.

2. WAN stands for Wide Area Network

Wide region Network (WAN): A WAN is a type of network that spans a greater geographical region, including several cities, buildings, or nations. WANs use technologies including satellite connections, fiber-optic cables, and leased lines to connect LANs over great distances.

3. The Network of Metropolitan (MAN)

A man network (MAN) is a data transportation system that connects multiple IT devices that are geographically dispersed but share a common metropolitan area. The boundaries of the metropolitan area are determined by the regional municipal authorities, which we cannot mention here. As the size of the metropolitan area increases, the MAN expands, while its proportion to the area decreases. According to the IEEE 802-2002 standard, a MAN is defined in this manner.

4. Personal Area Network, or PAN

This technology facilitates the connection of wireless devices like smartphones and computers with each other and allows them to connect with the Internet. It enables wireless communication between mobile devices and access to the Internet, making it possible to use wireless connections. Sometimes, the military or academic institutions of any country might use PAN.

A topology is defined?

The configuration or arrangement of linked devices in a network is referred to as its topology in computer networking. It explains the logical or physical organization of the network as well as how devices are connected to one another. There are several network topologies, and each has benefits and drawbacks of its own. Here are a few typical ones:

Topologies with the Highest Popularity

- The star topology
- ring topology
- mesh topologies
- linear bus topology
- spread of the star tree topology
- hybrid topology are some examples of topologies.

The topology of the linear bus

The primary cable in this arrangement passes through and is connected to connectors on both ends. In a data center, it establishes a linear link between nodes.

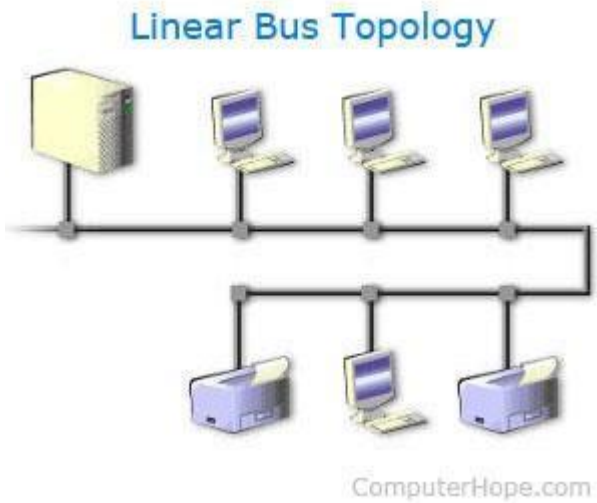

Figure 4.7.1: Topology of Linera Buses

The topology of the linear bus Benefits:

- Load balancing: You may more successfully balance the network load by dividing devices across two lines.
- greater Bandwidth: Compared to a single line design, there may be greater bandwidth available for data transmission with two lines.

The Linier Bus Topology's Drawback

- Single Point of Failure: The main bus serves as the single point of failure in linear bus topology, which is a significant disadvantage.
- Limited Scalability: Large-scale networks or networks with a high number of devices may not be a good fit for the linear bus topology.
- Limited Bandwidth Sharing: All of the bus's devices share the available bandwidth for communication when using a linear bus topology.
- Limited Flexibility: Compared to other topologies, adding or deleting devices from a linear bus architecture might be more difficult.

Topology of rings

Each device in a ring topology is connected to precisely two other devices, creating a ring or closed loop. Data moves in a single path around the ring, passing through every device on route to its final destination. Compared to bus topologies, this architecture can perform better and gives all devices equitable access. However, the network as a whole could be impacted if only one ring device or link breaks.

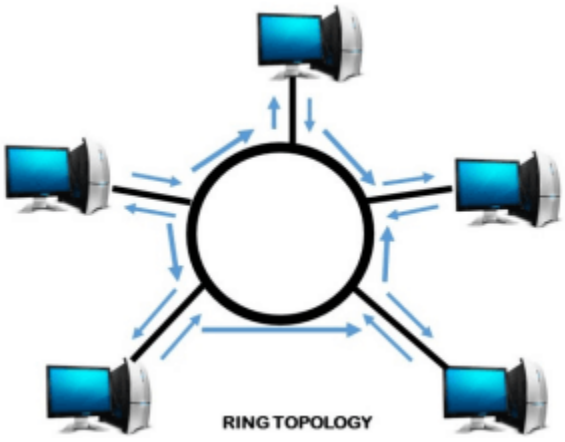

Figure 4.7.2: Topology of Rings

Ring topology's benefits

The topology of rings is structured in a highly organized manner. Whenever a node receives a clear signal, it is given the opportunity to transmit data. This means that there is less chance of collisions. In a ring topology, all traffic flows along a single path at high speeds, even during periods of high demand. Compared to the bus topology, the network performs better even under heavy traffic.

- Fault Tolerance: The intrinsic fault tolerance of a ring topology is one of its main benefits. Data can still move in the opposite direction around the ring to reach its destination in the event that one connection or device in the ring breaks.
- Effective Data Transmission: Since each device in a ring topology just needs to transfer data to the next device in the ring, data transmission in ring topologies is often more efficient than in other topologies.
- Security: Ring topology offers inherent security benefits.

Drawbacks of Ring Topology

In this topology, data or packets have to pass through every device from the first to the last step, which can result in slower performance compared to other structures.

- Despite its fault tolerance, a ring topology is vulnerable to a single point of failure, which occurs when a device or cable malfunctions, rendering the network as a whole useless and obstructing communication until the problem is fixed.
- The ring topology known as "Token Ring," which transmits data using token passing protocols, may result in cost related to token management.

Topology of Star

Every device in a star topology is linked to a single hub or switch. Every device connects directly with the central hub, which serves as a central center for communication. This architecture offers centralized administration, is simple to set up, and makes adding or removing devices simple. On the other hand, the entire network can stop working if the central hub fails.

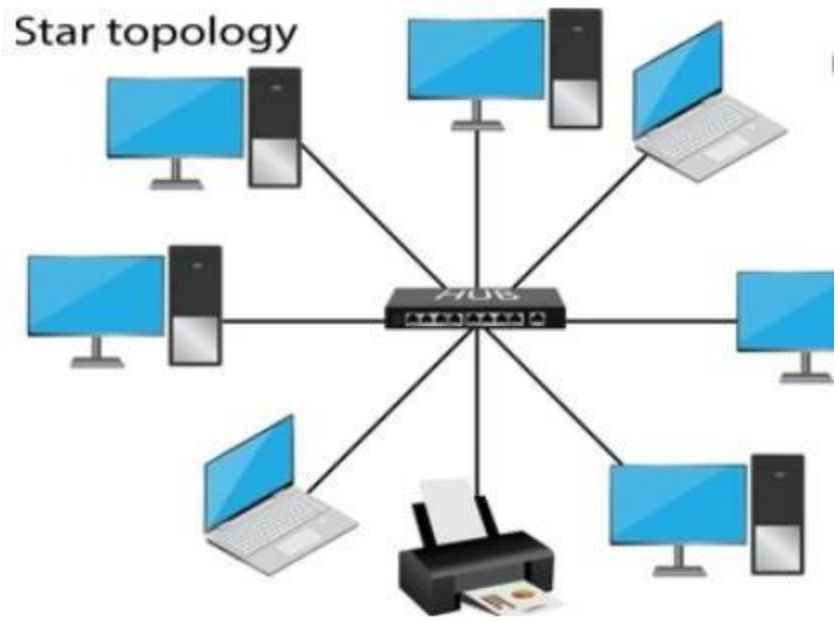

Figure 4.7.3: Topology of Star

Benefits of Star Topology

The addition or replacement of peripherals does not cause any network outages, and any issues can be easily identified and resolved. It supports the flow of data and can be easily connected a part of the network.

Topology of Star Limitations

An extended length of wire is needed for this topology than for a linear topology. If any hub, switch, or concentrator fails, a node attached to it will be disabled. This type of system is more expensive than traditional bus systems due to the higher cost of hubs and other components.

Mesh Topology

In a network where all computers and peripherals are directly connected to each other, communication can continue even if one connection fails. However, building redundant connections to each unit is costly and challenging, so this design is not commonly used in most computer networks. Wireless networks, on the other hand, often adopt this topology. The image below depicts a simple PC configuration on a mesh network.

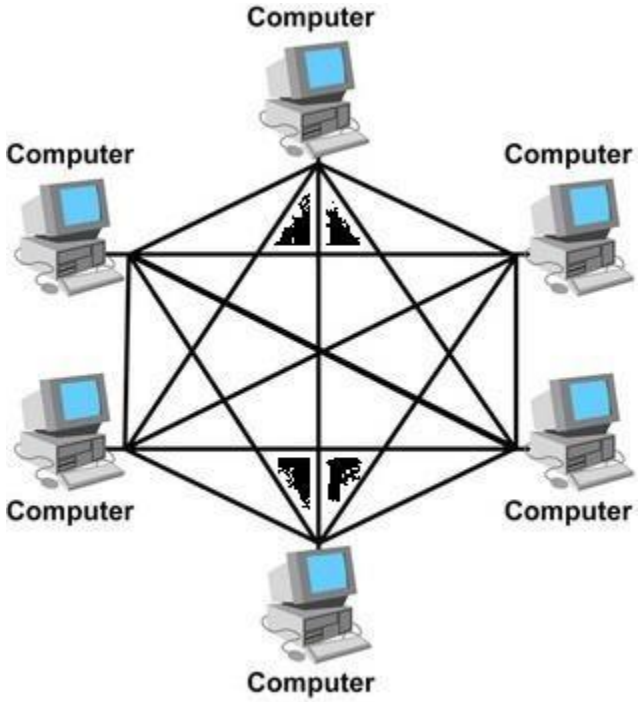

Figure 4.7.4: Topology of Mesh

Mesh topology benefits

- Since every device in a mesh network is linked to numerous other devices, mesh topology provides inherent fault tolerance since it provides alternative channels for data flow.
- Compared to other topologies, mesh topology offers increased bandwidth since it permits simultaneous data transmission via several pathways.

The Drawbacks of Mesh Topology

- Complexity: Especially in large-scale networks, mesh topology can be difficult to design, implement, and maintain.
- Cost: Because a mesh topology requires a large number of links, implementing it might be costly.
- Routing Overhead: In a mesh architecture, controlling routing and path selection can add complexity and overhead.

Expanded star or tree

A tree topology combines the advantages of both the star and linear bus topologies by creating clusters of data centers connected by a linear bus main cable. This topology enables the network to be customized and upgraded to meet the requirements for education.

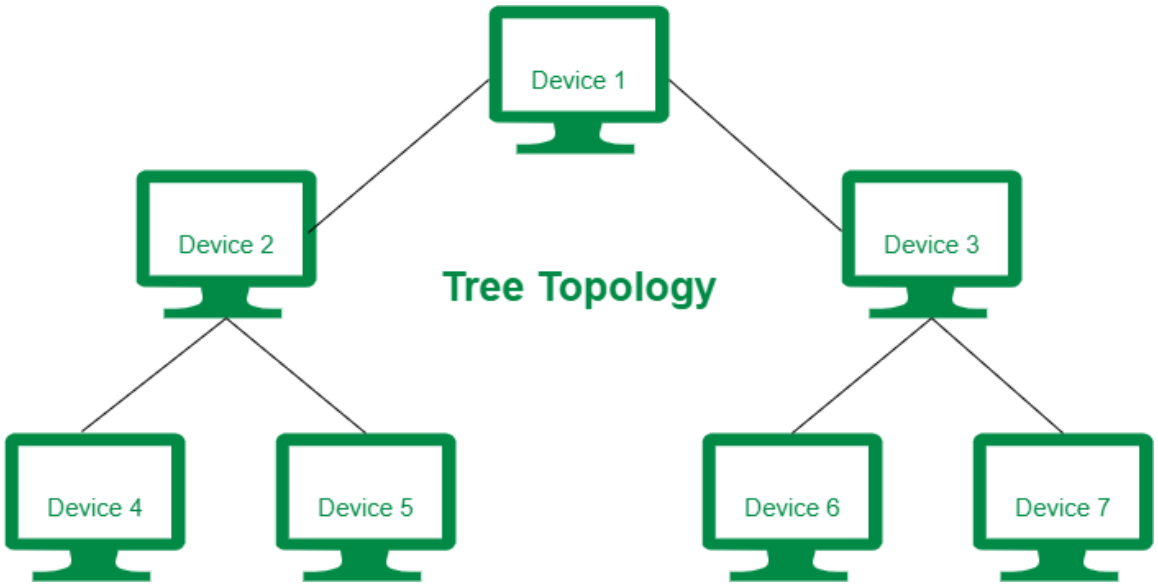

Figure 4.7.5: Topology of Tree

The advantages of tree topology

Scalability, hierarchical organization, centralized administration, effective data transfer, fault isolation, maximized bandwidth utilization, redundancy choices, and compatibility with hybrid setups are some of the benefits of tree architecture.

A Drawback for Tree Topology

The reliance of tree topology on the root node or central device is one of its disadvantages. A single point of failure might result from the root node failing, rendering the network as a whole unusable.

Hybrid Topology?

Combining parts of star, bus, ring, or mesh topologies with one or more other types of network topologies is known as a hybrid topology. A hybrid topology combines many topologies in an effort to maximize their advantages while minimizing their drawbacks, creating a resilient and adaptable network architecture. A typical hybrid topology, for instance, can be made up of interconnected star topologies, in which separate star networks are linked together by a ring network or central backbone bus. Combining wireless mesh networking with a wired star topology might offer both wired flexibility and wired dependability. This is an additional example.

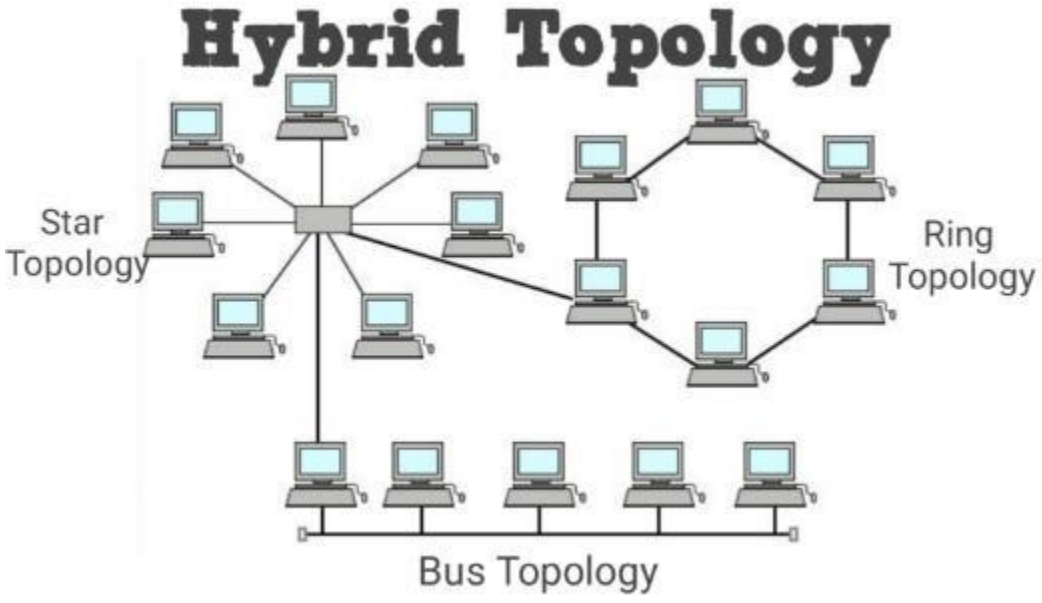

Figure 4.7.6: Topology of Hybrid

The benefits of hybrid topology

Scalability: By mixing many topologies, hybrid topology allows for flexible network expansion that successfully accommodates growth and changing business demands.

Fault Tolerance: Hybrid networks, which have various linked topologies, provide improved fault tolerance by restricting interruptions to certain areas in the event of a

breakdown and guaranteeing uninterrupted functioning.

Flexibility: By deploying wired, wireless, or other connection technologies as needed, organizations may customize network architecture to meet specific requirements and improve adaptability to a variety of circumstances.

Drawbacks of Hybrid Topology

Complexity: Because there are so many different network components involved in managing a hybrid architecture, it can be difficult. Operational complexity is increased by the particular knowledge and skills needed for designing, deploying, and troubleshooting a hybrid network.

Cost: Because a hybrid topology requires a variety of network components and technologies, implementing one might be costly. In addition to continuous maintenance and administration costs, organizations may have to pay more for hardware, software, and infrastructure at first.

Interoperability Challenges: A hybrid network may face interoperability issues when integrating various topologies and technologies. It could be necessary to make extra setup and integration efforts in order to guarantee flawless communication and compatibility between various components.

Dependency on Multiple Technologies: Because hybrid topology depends on a number of different protocols and technologies, there is a higher chance of vendor lock-in and compatibility problems. Companies may

CHAPTER 5

HEATMAP ANALYSIS

5.1 What is Wi-Fi Heatmap?

Wi-Fi heatmap is a graphic depiction of the coverage and strength of the wireless signal in a specific location, such a building, business, or house. Here's a thorough breakdown of how Wi-Fi heatmaps function.

5.2 Prepare Floor Plans:

Tool Used: Survey Software

Survey Software: The Wi-Fi heatmapping tool's name and version Net Spot.

Technology: Specifics regarding the survey device laptop with a specific wireless adapter.

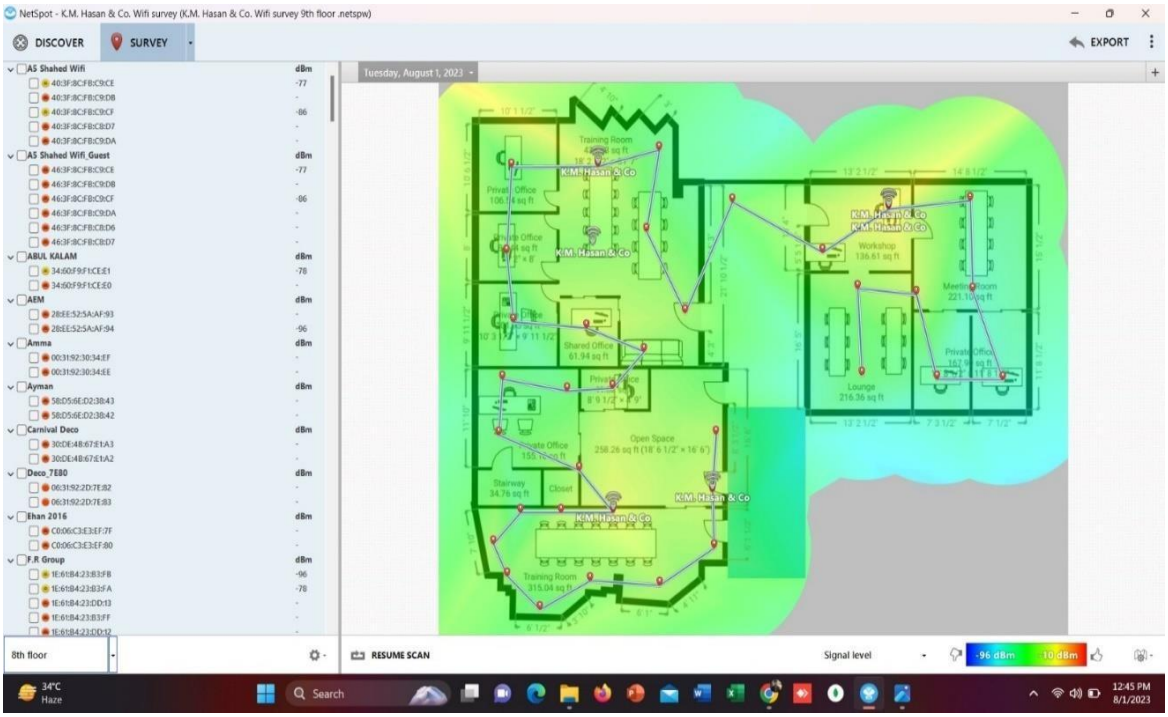

Figure 5.2.1: Floor Plan

5.3 Conduct the survey:

Start Surveying: Move slowly through the entire space, starting at one corner.

Walk the Space: Move about the space while holding the survey instrument, stopping sometimes to gather information.

Note down the data points: The device will log a number of parameters at each stop, including noise levels, signal-to-noise ratio (SNR), interference, and signal strength (RSSI).

Assure Coverage Make sure you cover everything by going to all the important places, such as the corners, corridors, rooms, and any possible obstacles.

5.4 Analysis

Gather Information:

The program will gather all of the survey data and compile it into a logical dataset after it is finished.

Produce Heat Maps:

The floor plan's signal strength statistics will be superimposed with visual heatmaps made by the software.

Color Coding:

Signal strengths are represented by different colors (blue for weak or no signals, red for strong signals).

5.5 Elements of Wi-Fi Heatmaps:

Real-Time Updates: As you navigate the region, certain sophisticated technologies have the ability to update the heatmap in real-time.

Support for Multiple SSIDs and Access Points: They are able to distinguish between several SSIDs and access points, displaying coverage for each.

Interference Analysis: They are able to display possible areas of interference caused by physical barriers or other wireless equipment.

Performance metrics: Data rates, packet loss, delay, and throughput can be displayed in addition to signal strength.

5.6 Heatmap Creation:

After the floor plan is imported, the program creates a heatmap overlay on it. Various signal intensities are represented by different colors, usually:

Red: Severe indication

Yellow/Orange: Mild signal

Green: Poor indication

Grey/Blue: No signal

Legend: A legend describes the signal strength values of the colors, such as -30 dBm to -50 dBm for strong transmissions.

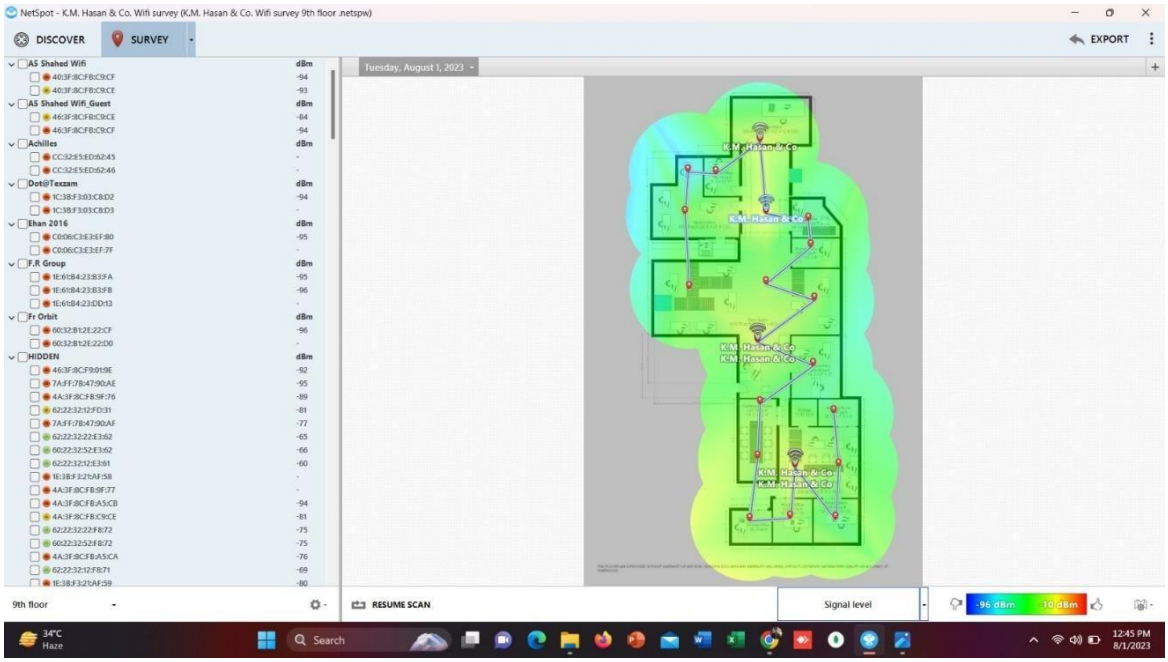

Figure 5.6.1: Floor Plan & heatmap overlay

Assessing Coverage:

Determine which regions have high, moderate, weak, or no signal coverage by examining The heatmap. Make a note of any irregularities in the signal distribution or interference patterns.

5.7 Summary of Findings:

Strong Signal Regions:

Locations: Strong signal coverage and low interference are found in some regions, usually those closest to entry points.

Performance: For demanding applications like video conferencing and huge file transfers, these areas offer optimal performance with high data rates and low latency.

Poor Signal Regions:

Locations: Weaker signal strength is observed in areas that are further away from access points or that are blocked by furniture, walls, or other physical barriers.

Performance: Users in these regions can encounter increased latency, slower speeds, and other network problems.

Dead Zones:

Locations: Some areas have no discernible Wi-Fi signal, frequently as a result of being extremely far from any access point or having large physical barriers in the way.

Impact: These areas are problematic since there is no network access at all, creating unusable areas.

5.8 Recommendation:

Reposition Aps: Move current access points to more advantageous places to improve coverage in regions with weak signals.

Install New APs: To guarantee complete coverage, install more access points to dead zones and weak signal areas.

Modify the Channel Allocation:

Channel management: Reconfigure access points to run on distinct channels in order to minimize interference and overlap. Utilize Both the 2.4 GHz and 5 GHz frequency bands to spread the network load and improve performance. This technique is known as dual-band utilization.

Update the hardware:

Contemporary Access Points: Swap out antiquated access points for more recent models that provide enhanced features like Wi-Fi 6 and faster speeds and longer range.

CHAPTER 6

ROUTING

6.1 How the OSI Works

Application Layer

As the highest layer in the OSI architecture, the OSI Application Layer is in charge of giving applications and end users direct access to network services. Its main duties include managing data formatting and representation, enabling communication between various programs, and supporting user authentication and encryption.

Presentation Layer

The presentation layer works in tandem with the application layer to enable effective utilization of information. Its responsibilities include handling tasks such as formatting, encryption/decryption, and compression/decompression of data. Additionally, the presentation layer establishes and maintains connections between the computers and applications of the other layers. It supports simplex, half-duplex, and full-duplex communication modes, which are all unidirectional and bidirectional.

Transport Layer

On a network, the OSI Transport Layer enables dependable and effective communication between devices. By handling mistake detection and repair, dividing up information into digestible chunks, and controlling flow control and congestion, it guarantees data delivery. Additionally, multiplexing is provided by the Transport Layer to accommodate several connections at once. All things considered, it guarantees precise and effective data delivery across the network.

Network Layer

The OSI Network Layer controls data packet forwarding and routing between various networks. It is positioned between the Data Link Layer and the Transport Layer. It is in charge of congestion management, packet forwarding, and addressing, making sure that data travels to its destination quickly and reliably.

Data Link Layer

Over a physical link, the OSI Data Link Layer controls the dependable transfer of data between neighboring network nodes. It manages flow control, media access control, error detection and correction, and framing. This layer coordinates communication between devices on the same network segment, guaranteeing precise and efficient data delivery.

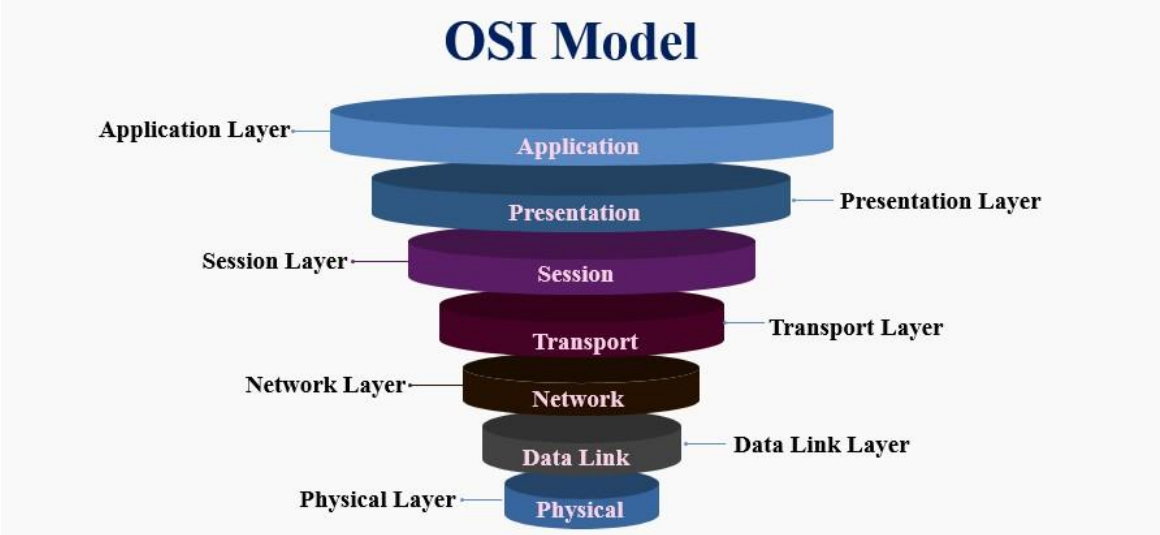

Figure6.1.1: OSI Model

Physical Layer

The physical layer manages the physical connections, whether they are wired or wireless, that link network nodes. This layer deals with the functioning of the wire and connector. It generates raw data and serves as the origin of the series of 0s and 1s.

6.2 Internet Protocol Addressing

The process of giving each device on a network a unique numerical identification to facilitate communication is known as IP addressing. The Internet Protocol (IP), which defines these addresses, makes it easier for data packets to be routed across networks, resulting in accurate and effective information transfer.

IP address categories for users

- IPv4 Addressing: 32-bit numerical identifiers make up IPv4 (Internet Protocol version 4) addresses.

- IPv6 Addressing: 128-bit hexadecimal identifiers make up IPv6 (Internet Protocol version 6) addresses.

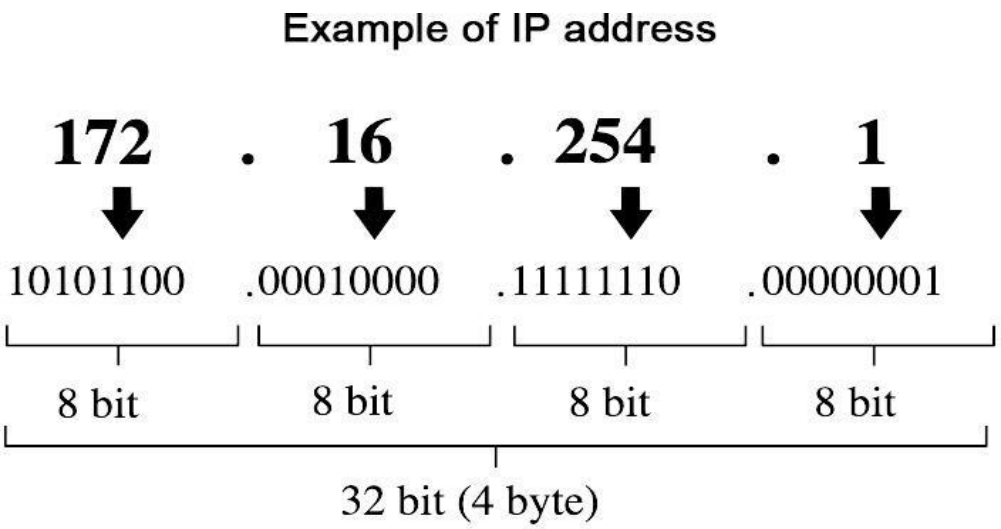

Figure 6.2.1: Addressing IP

One Hexadecimal notation is:

When using the dotted decimal notation, there are a couple of rules to follow: 1. Each segment or byte should have a value ranging from 0 to 255. (e.g., 054 is incorrect, while 54 is correct). 2. There should be no leading zeros in any segment.

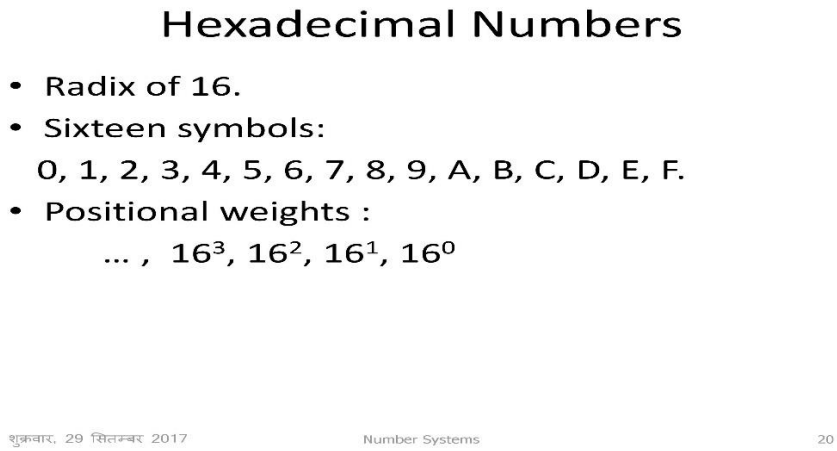

Figure 6.2.2: Hexadecimal Notation

The 32-bit address space in IPv4 addressing is segmented into many classes and subclasses. Yet the idea of subclasses based on fixed address ranges has been abandoned with the advent of Classless Inter-Domain Routing (CIDR), which permits variable-length subnet masks. Rather, IPv4 addresses are assigned and sub-netted according to the needs of the network. Having stated that, the following are five instances of IPv4 addresses with various subnet masks:

Class A Subnet: Address Range: 10.0.0.0 - 10.255.255.255, Subnet Mask: 255.0.0.0

Class B Subnet: Address Range: 172.16.0.0 - 172.31.255.255, Subnet Mask: 255.255.0.0

Class C Subnet: Address Range: 192.168.0.0 - 192.168.255.255, Subnet Mask: 255.255.255.0

Private Subnet: Address Range: 172.16.0.0 - 172.31.255.255, Subnet Mask: 255.255.0.0

Public Subnet: Address Range: Varies, Subnet Mask: Varies.

Address range and subnet mask for the public subnet are both variable. These illustrations show how IPv4 addresses can be sub-netted inside various address spaces.

Class	Private IP address range	Subnet mask
A	10.0.0.0 – 10.255.255.255	255.0.0.0
B	172.16.0.0 – 172.16.31.255	255.255.0.0
C	192.168.0.0 – 192.168.255.255	255.255.255.0

Figure6.2.3: Class Address

6.3 Subnet

A subnet is a logical division of an IP network in networking that is made by dividing a larger network into smaller sections. Every subnet is distinguished by a subnet mask and has a unique range of IP addresses.

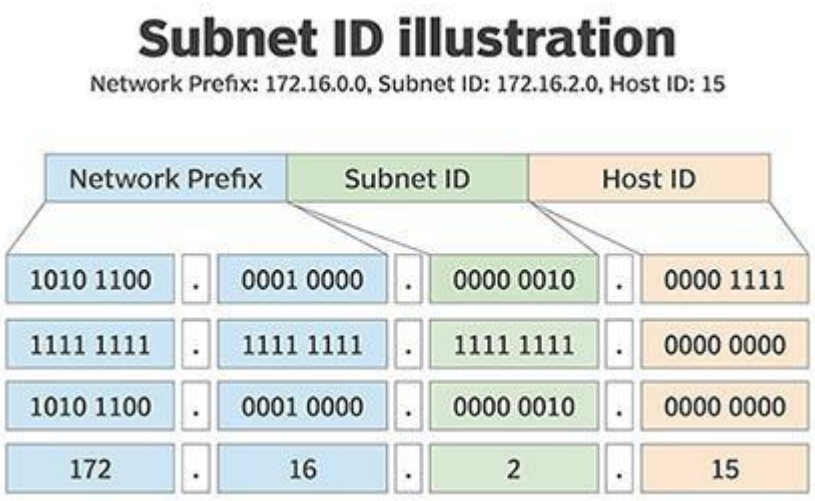

Figure 6.3.1: Subnet

Table of Subnet Mask References

The act of splitting a single, bigger network into smaller, easier-to-manage subnetworks also known as subnets—is known as subnetting. This divide makes it possible to better manage and secure the network, use IP address space more effectively, and perform better. A subnet mask is used in subnetting to separate the IP address space into host and network segments. Which part of the IP address identifies the network and which part identifies the host within that network are determined by the subnet mask.

Here's a brief summary of the address ranges for each IP address class:

Class A: Addresses range from 1.0.0.0 to 126.255.255.255.

Class B: Addresses range from 128.0.0.0 to 191.255.255.255.

Class C: Addresses range from 192.0.0.0 to 223.255.255.255.

Class D: Addresses range from 224.0.0.0 to 239.255.255.255.

Class E: Addresses range from 240.0.0.0 to 255.255.255.255.

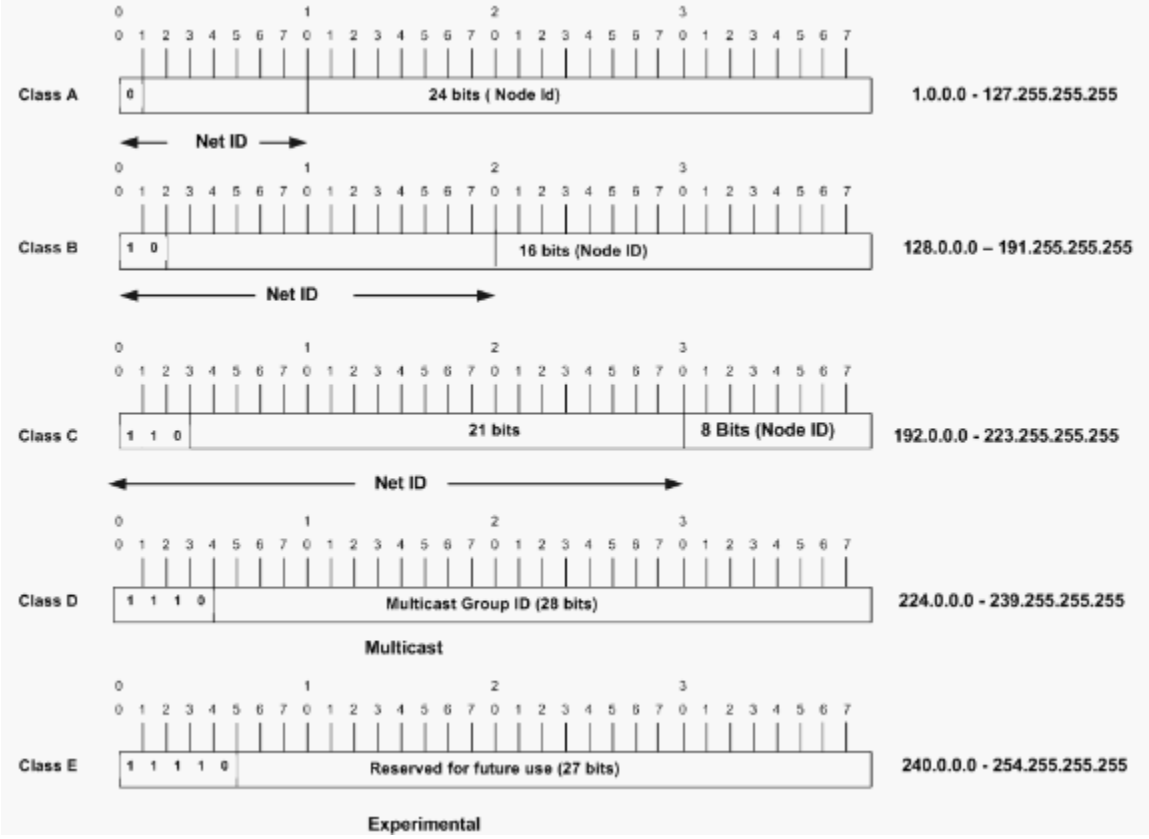

Figure 6.3.2: Reference Table for Subnet Masks

6.4 VLSM

A networking method called variable length subnet masking, or VLSM, enables IP addresses to be assigned to subnets of varying sizes inside the same network. VLSM allows subnet masks of different lengths to be used, in contrast to standard subnetting where all subnets have the same subnet mask. This adaptability makes better use of IP address space by optimizing address use and enabling network managers to assign addresses according to the unique needs of each subnet.

6.5 Section of Route Types

Route types in networking may be divided into many major categories:

Static Routes: Routes that network administrators manually configure and establish fixed pathways for packets of data.

Dynamic Routes: Adapt to changes in the network by automatically updating depending on routing protocols such as OSPF, BGP, or RIP.

Default Routes: Used when there is no direct path and specifies where traffic should be directed in the event that no specified route matches.

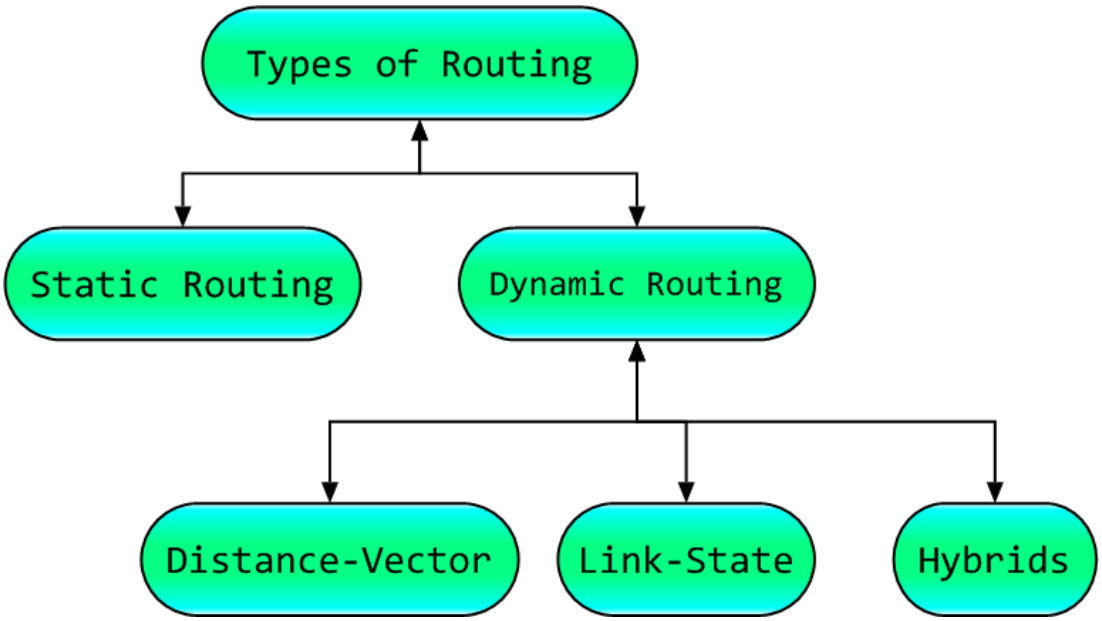

Figure 6.5.1: Types of Routing

6.6 The Static Routing

Network managers can manually configure routing tables in a network using the static routing approach, which identifies set pathways for data packets to travel in order to reach

particular destinations. Administrators add these routes into the routing table of routers or switches, and they remain there unless they are modified manually.

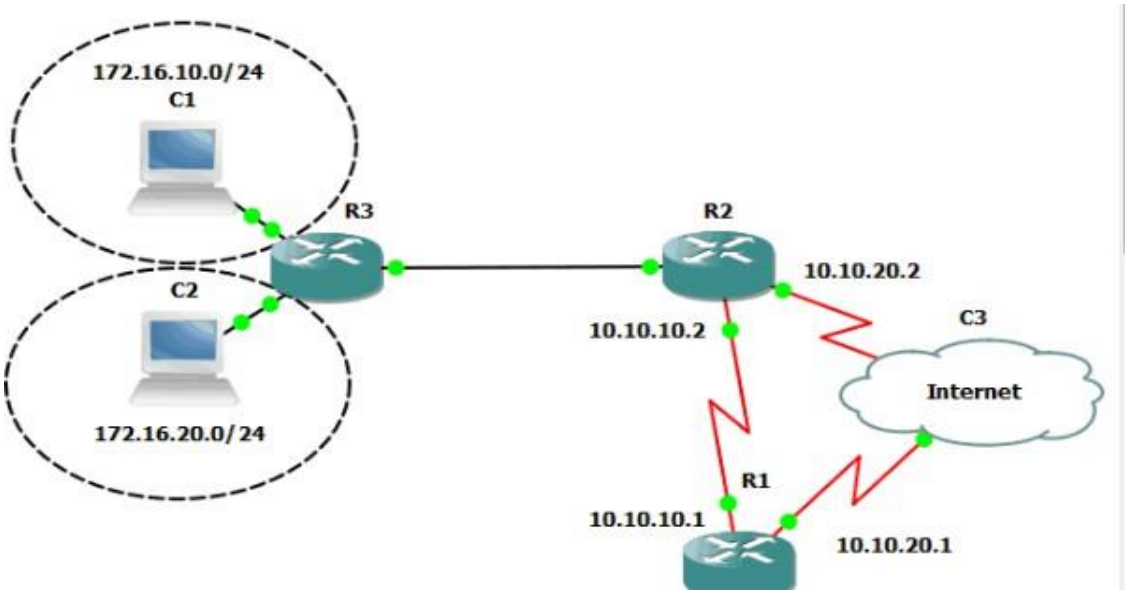

Figure 6.6.1: The Static Routing

Using static routes is one method for connecting to distant networks. Static routes are usually used for network-to-network routing in operational networks. Furthermore, the DCE has been configured by the network administrator to use the serial ports on R1 and R3, and all other parameters are accurate. But R1 can only reach the s0/0/0 interface of R2 and HOST A; it cannot reach the s0/0/1 interface. Likewise, only R2's s0/0/1 interface has the ability to ping HOST B; R3 is unable to do so. As the example below shows, communication between HOST A and HOST B is not possible in this situation.

```
HOST B>ping 192.168.4.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.
Reply from 192.168.1.1: Destination host unreachable.

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
HOST A >ping 192.168.1.2

Pinging 192.168.4.2 with 32 bytes of data:

Reply from 192.168.4.1: Destination host unreachable.
Reply from 192.168.4.1: Destination host unreachable.
Reply from 192.168.4.1: Destination host unreachable.
Reply from 192.168.4.1: Destination host unreachable.

Ping statistics for 192.168.4.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Figure 6.6.2: Routing in static communication.

6.7 Routing's Dynamism

With dynamic routing, routers may react to changes in the network more effectively and automatically by updating their routing tables depending on information shared between them using routing protocols. This process doesn't require human interaction.

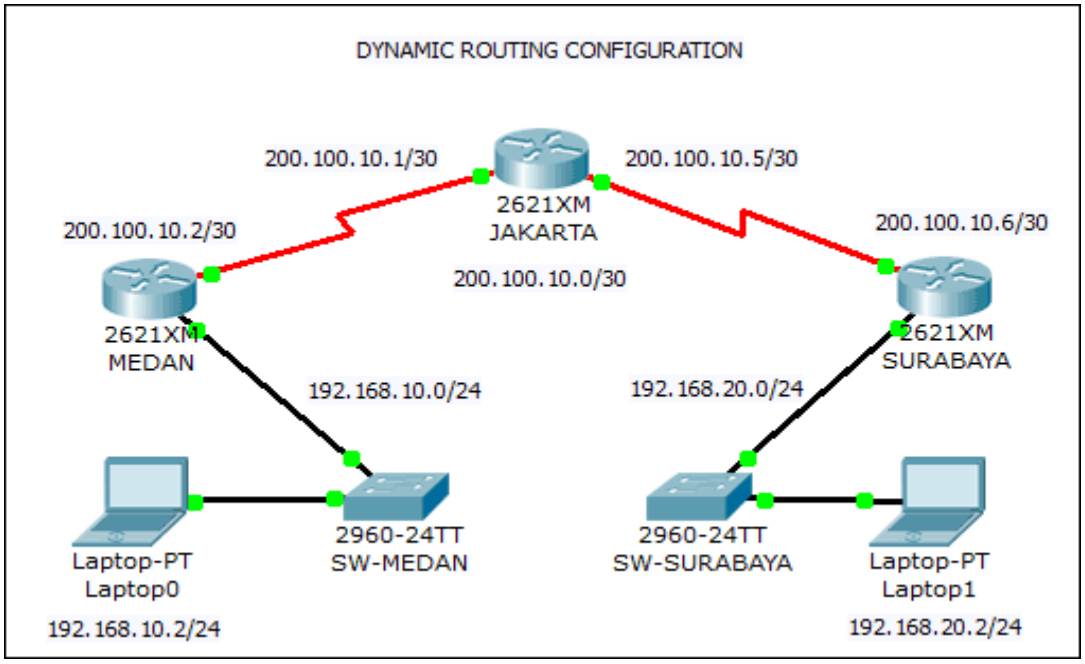

Figure 6.7.1: Dynamic Routing Configuration

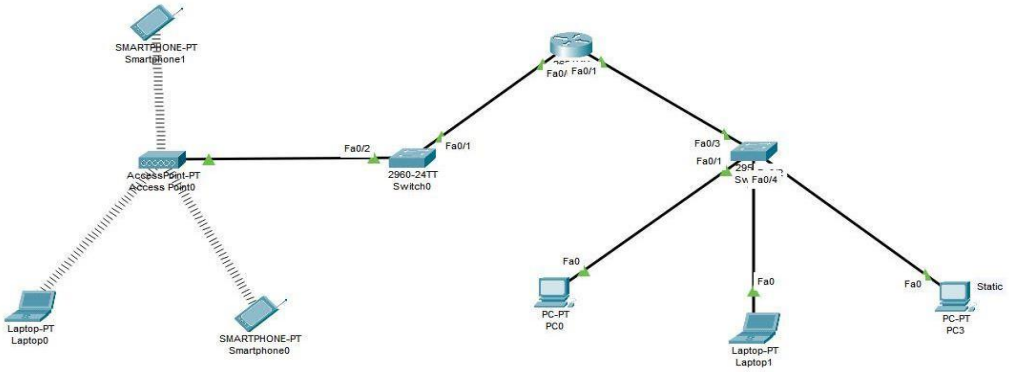

Figure 6.7.2: Dynamic Routing Configuration

CHAPTER 7

A SMART PLAN WITH COMPETITIONS

7.1 Acquired Proficiencies

There are many talents accessible in today's employment market, therefore it's critical to make sure we are practically proficient. A learning outcome is a declaration of what a student is expected to know, comprehend, or be able to do as a consequence of a learning process. It is sometimes referred to as an earned outcome. My future employment will include computer networking; thus, I will be in charge of leading the router configuration team and installing and removing system and server equipment from two datacenters. I completed more than simply problem-solving activities during my internship, which will enable me to maintain composure in the face of important situations in the future. Additionally, aside from understanding how to install

7.2 Smart Plan

An organization's senior management is instructed to create a strategy that sets it apart from competitors' strategies in order to get higher and better performance benefits. This is crucial for both career success and personal fulfillment. This internship will help you create a well-thought-out plan.

7.3 Observations

K.M. Hasan & Co is renowned for providing exceptional customer service. From the beginning, they have taken great care in delivering their services and make significant efforts to retain their clients and ensure repeat business. This company provides the technical community with a highly effective and efficient network through corporate network solutions and communication.

7.4 Challenges

It is a common belief that no job is entirely easy, and every workplace presents its own set of challenges. Therefore, we should approach our work with respect and dedication. Internships provide an excellent opportunity to gain experience, network, and identify our strengths and weaknesses. This is the time to practice. Some people find it difficult to learn and understand new things. However, more challenges must be overcome to find solutions. During my training sessions at the company, I found that there were too few problems to solve. I completed certain jobs on my own and sent them by email to my supervisor. I was responsible for completing some of the work, while my managers and laborers handled the remaining tasks. As a result, I was able to complete a few tasks during my training.

CHAPTER 8
SUMMARY AND FUTURE PROJECTS

8.1 In Conclusion

I completed my internship successfully, which provided me with valuable real-world experience. This internship taught me how to work for long hours in a confined office space and develop the perseverance to overcome challenges and complete tasks efficiently. I now make it a point to work hard eight or nine hours a day, five or six days a week, since this is crucial in the corporate and commercial worlds. The training program also emphasized the importance of time management, which is a crucial skill in the professional world.

8.2 Career Possibilities

There is a strong need for careers in the sector of computer networking. A wide range of job options, including CCNA Routing and Switching, Linux, and many more, are offered by the IT business, which is divided into numerous categories. Networking include computer-to-computer networking, wireless networking, router and switching, network system management, and network engineering. It is one of the main components of information technology.

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APPENDIX

Appendix A: Thoughts Regarding the Internship:

An integral part of our company's knowledge acquisition strategy is the internship. Therefore, it plays a crucial role in enhancing our practical skills. I took everything extremely seriously when I was in business school, and my internship helped me to get valuable experience in problem-solving, project management, and customer management. I got the chance to collaborate with an accomplished professional who gave me invaluable instruction during the internship. This experience has had a significant impact on my life, educating me on maintaining composure under duress and juggling a personal and professional life. It has also improved my comprehension of my current circumstance and my ability to make future preparations. Internships provide an excellent opportunity to interact with professionals and learn how they handle various important responsibilities.

Internship on Network and Technical Support System

ORIGINALITY REPORT

23%	21%	3%	13%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	dspace.daffodilvarsity.edu.bd:8080 Internet Source	10%
2	Submitted to Daffodil International University Student Paper	5%
3	Submitted to Hawaii Pacific University Student Paper	1%
4	Submitted to University of Wales Institute, Cardiff Student Paper	1%
5	Submitted to Management Development Institute Of Singapore Student Paper	1%
6	Submitted to Alliance University Student Paper	1%
7	Submitted to American Intercontinental University Online Student Paper	<1%
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