

Company Business Network System

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COMPANY BUSINESS NETWORK SYSTEM PROJECT REPORT

This Report Presented in Partial Fulfillment of the course **CSE322:**
Computer Network in the Computer Science and Engineering
Department



DAFFODIL INTERNATIONAL UNIVERSITY
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DECLARATION

We hereby declare that this lab project has been done by us under the supervision of **Name of the course teacher, course teacher's Designation**, Department of Computer Science and Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere as lab projects.




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COURSE & PROGRAM OUTCOME

The following course have course outcomes as following:.

Table 1: Course Outcome Statements

CO's	Statements
CO1	Define and Relate classes, objects, members of the class, and relationships among them needed for solving specific problems
CO2	Formulate knowledge of object-oriented programming and Java in problem solving
CO3	Analyze Unified Modeling Language (UML) models to Present a specific problem
CO4	Develop solutions for real-world complex problems applying OOP concepts while evaluating their effectiveness based on industry standards.

Table 2: Mapping of CO, PO, Blooms, KP and CEP

CO	PO	Blooms	KP	CEP
CO1	PO1	C1, C2	KP3	EP1, EP3
CO2	PO2	C2	KP3	EP1, EP3
CO3	PO3	C4, A1	KP3	EP1, EP2
CO4	PO3	C3, C6, A3, P3	KP4	EP1, EP3

The mapping justification of this table is provided in section 4.3.1, 4.3.2 and 4.3.3.

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Chapter 1

Introduction

The Company Business Network System project aims to build a secure and efficient network infrastructure that connects all departments and resources. It enables smooth communication, data sharing, and centralized control, supporting business operations with reliability, scalability, and strong security.

1.1 Introduction

In modern businesses, seamless communication and secure data access are critical for efficiency and growth. Many companies face challenges like poor network performance, lack of centralized control, and weak security. This project aims to design a reliable and scalable business network system that connects all departments through LAN/WAN, enabling secure communication, efficient data sharing, and centralized management. By addressing current limitations, the system enhances productivity, data integrity, and network security.

1.2 Motivation

The motivation behind this project is to solve common network issues such as slow communication, lack of security, and poor data management that many companies face. As businesses grow, their need for a stable and secure network becomes essential. Implementing an efficient business network system not only addresses these technical problems but also improves overall productivity and data protection. Solving this problem will enhance our understanding of network design, security protocols, and system management, which are crucial skills in the field of computer networks and beneficial for future career development.

1.3 Objectives

The primary objective of this project is to design and implement a secure, reliable, and scalable business network system that meets the communication and operational needs of a growing company. This includes establishing a structured LAN/WAN infrastructure, enabling centralized access to shared resources, and ensuring high-speed data transfer across departments. The project also aims to integrate strong security measures—such as firewalls, VLANs, and access controls—to protect sensitive data and prevent unauthorized access. Additionally, the system will support easy monitoring, maintenance, and future expansion to adapt to evolving business requirements.

1.4 Feasibility Study

The development of a secure and scalable business network system is both practical and supported by extensive academic research and real-world implementations. Studies highlight how structured LAN/WAN networks, combined with technologies such as VLANs, firewalls, and centralized access control, can significantly enhance operational efficiency and data security [1]. Business networks, when strategically designed, enable improved communication, reduced system downtime, and efficient resource sharing, which are particularly beneficial for small and medium enterprises (SMEs) [3].

Research into business network systems emphasizes that these structures are not only technical infrastructures but also strategic tools that align with organizational goals, facilitating innovation and adaptability in changing markets [2]. The integration of real-time monitoring and management solutions, such as Zabbix, PRTG Network Monitor, and SolarWinds Mobile Admin, further strengthens the feasibility of implementing robust and responsive network systems. These tools support proactive maintenance, remote access, and real-time diagnostics, demonstrating both the technical and economic viability of the proposed solution.

Overall, existing literature and technological advancements validate the feasibility of our network project, offering a strong foundation for implementation in digitally driven and dynamic business environments [1][2][3].

1.5 Gap Analysis

Despite the availability of basic business network solutions, many systems fall short in addressing the specific needs of small to medium-sized enterprises (SMEs). Key gaps include inadequate scalability, inefficient network design leading to performance bottlenecks, and insufficient security measures. Additionally, many existing systems lack real-time monitoring, remote access capabilities, and centralized control, which are critical for proactive network management and rapid issue resolution.

This project aims to bridge these gaps by developing a network system that is not only secure and scalable but also optimized for performance and ease of management. By integrating modern security protocols, centralized monitoring tools, and a flexible network architecture, the proposed solution will provide a comprehensive, cost-effective alternative that meets the evolving needs of SMEs while ensuring operational efficiency and data protection.

1.6 Project Outcome

The successful implementation of this project will result in a robust, scalable, and secure business network system that directly addresses the needs of small to medium-sized enterprises (SMEs). Key outcomes include:

- **Enhanced Network Performance:** A high-performing network with minimal downtime and optimized data flow, ensuring efficient communication and uninterrupted business operations.

- **Strengthened Security:** Advanced security measures, including firewalls, VLANs, and access control systems, will provide a fortified network infrastructure that protects sensitive data and prevents unauthorized access.
- **Centralized Control and Monitoring:** A unified platform for real-time monitoring and centralized management of network resources, enabling proactive issue resolution and reducing system maintenance costs.
- **Scalability and Flexibility:** A scalable network design that accommodates future growth, allowing businesses to easily expand without significant redesign or additional costs.
- **Cost-Effective and Sustainable Solution:** An affordable network solution that balances performance, security, and scalability, providing SMEs with an efficient, future-proof system within budget constraints.

Ultimately, the project will provide businesses with a reliable, secure, and efficient network infrastructure that drives operational efficiency, supports future expansion, and enhances data protection.

Chapter 2

Proposed Methodology/Architecture

The network system will utilize Cisco technologies to create a secure, scalable, and high-performance infrastructure. A hybrid LAN/WAN design with Cisco routers and switches will ensure reliable communication. Security will be reinforced using Cisco firewalls, VLANs, and role-based access control (RBAC). Centralized resource management, combined with redundant pathways, will ensure continuous availability. Real-time monitoring tools like Cisco Network Performance Monitor and PRTG, along with remote management apps, will streamline maintenance. Designed for scalability, the system will support seamless future growth.

2.1 Requirement Analysis & Design Specification

The Requirement Analysis identifies key needs to ensure the network system is secure, efficient, and scalable. The system must support seamless communication, centralized resource management, and robust security. The main requirements are:

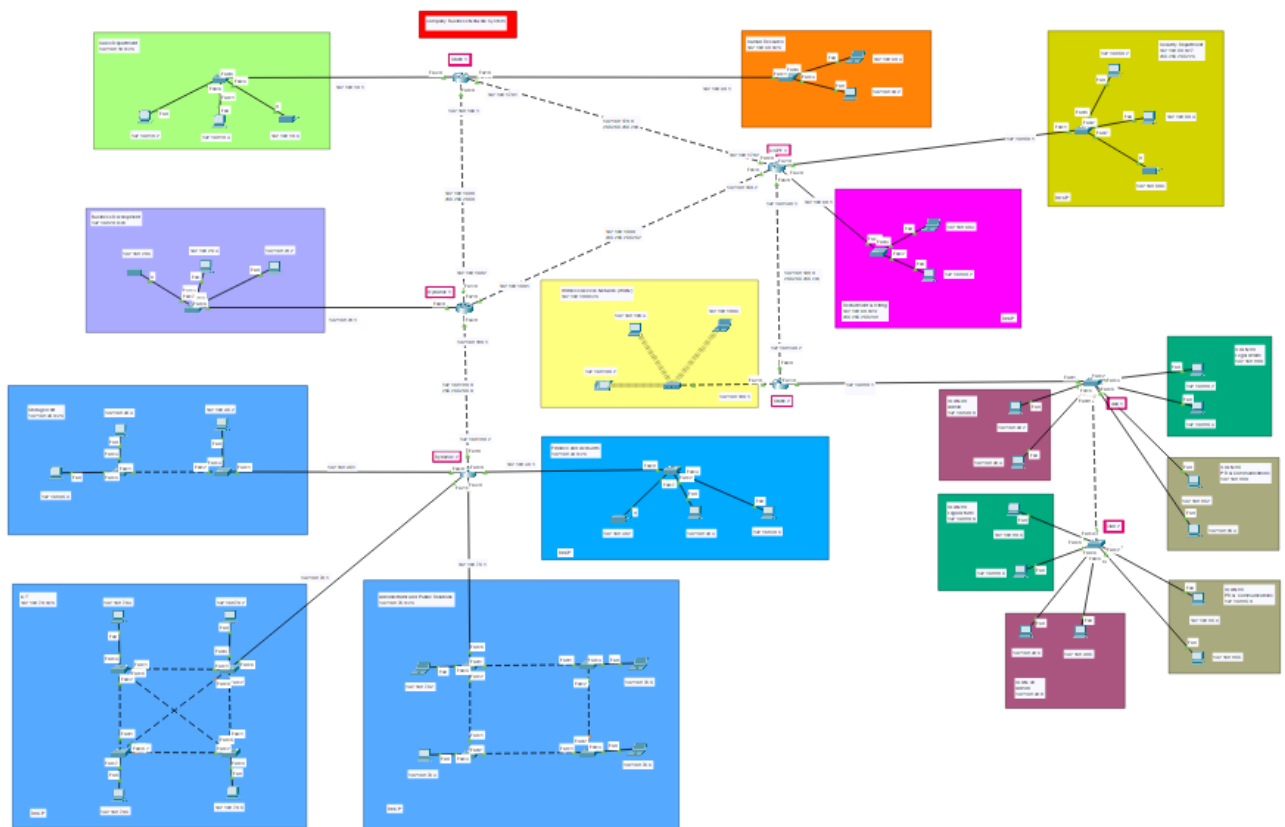
Functional Requirements:

- **Reliable Connectivity:** Integration of LAN/WAN for smooth internal and external communication.
- **Centralized Resource Management:** Easy access to files, databases, and network resources.
- **Security:** Implementation of Cisco firewalls, VLANs, and strict access controls to safeguard sensitive data.
- **Monitoring & Remote Management:** Real-time performance monitoring with remote access tools for efficient troubleshooting.

Non-Functional Requirements:

- **Scalability:** The system must grow with the company, accommodating future expansions without significant redesign.
- **Performance:** High-speed data transfer, low latency, and minimal downtime are crucial.
- **Reliability:** Redundant connections and failover mechanisms will ensure uninterrupted service.
- **Usability:** A user-friendly interface for simplified network management and maintenance.

The Design Specification phase ensures that Cisco technologies—routers, switches, and industry-standard protocols—are integrated to meet these requirements, creating a flexible, secure, and future-ready network system that supports the business's evolving needs.



1. Dashboard (Main Control Panel)

Purpose: Offer a high-level view of the entire network's real-time status.

Key Features:

- Network Overview: Live stats on bandwidth usage, active devices, CPU load, uptime
- System Alerts: Security warnings, device disconnections, unusual traffic
- Quick Tools: Add device, initiate ping test, create VLAN, restart switch/router
- Mini Network Map Preview

2. Network Topology Map

Purpose: Visually represent the physical/logical layout of the network.

Features:

- Interactive Map: Clickable nodes for switches, routers, servers, and users
- Live Status Indicators: Color-coded (Green – Active, Yellow – Warning, Red – Down)
- Topology Styles: Star, Tree, or Hybrid depending on the network design
- Hover Info: IP address, MAC, uptime, port status

3. Device Management Interface

Purpose: Manage all connected network devices from one place.

Features:

- Device Table: Name | IP Address | MAC | Status | VLAN | Actions
- Search/Filter: By IP, type, location, or department
- Control Options: Ping, Restart, Isolate, Configure Port
- Add/Edit/Delete Devices

4. User Access & Permissions

Purpose: Control user access levels across the network.

Features:

- User Roles: Admin, IT Staff, Department User
- Access Control: Assign access to specific VLANs or resources
- Login Logs: Track login time, IP, and accessed modules
- Two-Factor Authentication Setup (Optional)

5. Security Configuration

Purpose: Provide basic network security management features.

Features:

- Firewall Rules Panel: Allow/Block ports or IP ranges
- Access Policies: Configure VLAN isolation and inter-VLAN routing
- Traffic Filtering: Protocol-based filtering (e.g., block torrents/social media)
- Threat Log Viewer

6. Network Monitoring & Logs

Purpose: Monitor performance and track system events.

Features:

- Live Traffic Graphs: Bandwidth by device/VLAN
- System Logs: Errors, warnings, login attempts, config changes
- Export Logs: PDF/CSV for reports or analysis

UI Design Style

- Modern Web UI: Built with frameworks like Bootstrap, Tailwind, or Material UI
- User-Friendly Layout: Tabbed views, collapsible panels, responsive design
- Optimized for Desktops & Laptops

2.2 Overall Project Plan

The overall project plan outlines the phased development and deployment of a secure and scalable business network system. The plan is structured to ensure smooth execution, from initial research to final implementation, using Cisco-based solutions and industry best practices.

Phase 1: Requirement Analysis

- Identify business goals, network needs, and user roles
- Gather technical specifications (number of users, devices, departments)
- Determine bandwidth, security, and scalability needs

Phase 2: Network Design

- Develop logical and physical network topologies (e.g., star, hybrid)
- Design IP addressing scheme and subnetting
- Plan VLANs, routing protocols, and security zones using Cisco technologies

Phase 3: Resource Planning

- Select appropriate hardware: routers, switches, firewalls (Cisco-based).
- Choose network management tools (Cisco Packet Tracer, real hardware if applicable).
- Allocate budget, manpower, and timeframes.

Phase 4: Implementation

- Configure and install core devices (Cisco routers, Layer 2/3 switches).
- Set up VLANs, access control lists (ACLs), DHCP, and DNS.
- Integrate firewall and security policies.

Phase 5: Testing & Troubleshooting

- Perform functional testing: connectivity, failover, load testing.
- Use simulation tools for stress testing and monitoring.
- Troubleshoot and resolve network issues.

Phase 6: Documentation & Evaluation

- Prepare network documentation (topologies, configs, IP plan).
- Collect feedback from test users.
- Final evaluation of performance, reliability, and security.

Phase 7: Future Scalability Planning

- Recommend upgrades for future needs (cloud integration, wireless access, redundancy).
- Suggest monitoring tools and periodic audits.

Chapter 3

Implementation and Results

The network system was implemented using Cisco Packet Tracer, featuring routers, switches, IP addressing, and VLANs to segment departments. Security was enhanced through ACLs, port security, and basic firewall rules. After configuration, the network was tested for connectivity, routing, and fault tolerance. Results showed successful communication, improved security, and a scalable design ready for future expansion.

3.1 Implementation

The implementation phase involved the practical setup and configuration of the company's internal network using Cisco-based equipment and simulation tools like Cisco Packet Tracer. The steps included:

1. Device Configuration:

- Cisco routers and switches were configured with appropriate IP addressing and subnetting.
- VLANs were created to segment departments (e.g., HR, Finance, IT) and enhance security.
- Routing protocols such as RIP or OSPF were implemented for efficient data forwarding.

2. Security Setup:

- Access Control Lists (ACLs) were applied to restrict traffic between VLANs where needed.
- Basic firewall configurations were established to prevent unauthorized access.
- Port security and password encryption were implemented on switches.

3. Testing:

- End-to-end connectivity was tested using ping and traceroute.
- Simulated traffic was generated to evaluate performance, routing efficiency, and fault tolerance.
- Redundancy was tested through link failure scenarios.

3.2 Performance Analysis

The performance analysis of a company's business network system involves evaluating how effectively and efficiently the network supports the company's operations. This analysis can help identify areas of improvement, enhance security, optimize bandwidth usage, and ensure the system

meets business needs. Below are the key aspects to consider for performing such an analysis:

1. Network Speed and Latency

- **Bandwidth:** Measure the actual bandwidth used by the network versus the available bandwidth. This helps determine if the network can handle the business's data traffic.
- **Latency:** Evaluate the time it takes for data to travel from the source to the destination. High latency can impact real-time applications (like VoIP, video conferencing, etc.).
- **Throughput:** Analyze the actual data transfer rates and compare them to expected or ideal throughput levels.

2. Network Uptime and Reliability

- **Availability:** The network should be continuously available to support business operations. Measure downtime and understand the causes behind it.
- **Redundancy:** Examine whether backup systems or alternate paths exist to keep the network running during failures.
- **Error Rates:** Assess network errors, packet loss, or retransmissions that might indicate problems in the infrastructure.

3. Security and Threat Detection

- **Firewall and Intrusion Detection:** Check if the network is secure from unauthorized access, malware, and cyberattacks. Tools such as firewalls and IDS (Intrusion Detection Systems) are essential.
- **Encryption:** Evaluate the effectiveness of encryption in protecting sensitive business data as it travels across the network.
- **Vulnerabilities:** Perform vulnerability scans to identify weak points in the system that could be exploited.

4. User Experience and Access Control

- **Access Speed:** Monitor how quickly users can access business applications, files, and services. Poor access speeds may indicate problems with network design or overloaded servers.
- **Quality of Service (QoS):** Ensure that critical applications (e.g., ERP, CRM systems) get the necessary network resources to perform optimally, even during peak load times.
- **Access Permissions:** Review user access controls to ensure proper access rights are in place for sensitive or confidential data.

5. Traffic Analysis and Utilization

- **Traffic Patterns:** Use network monitoring tools to track the flow of data, applications, and services across the network. This can help identify bottlenecks, unused resources, or areas for optimization.
- **Congestion:** Determine if there are network segments that are consistently congested, causing slow performance or packet loss.
- **Traffic Types:** Examine whether the network is being used for business-critical tasks (e.g., file transfer, VoIP) or excessive non-business activities (e.g., streaming, gaming).

6. Scalability and Growth Potential

- **Current Capacity:** Evaluate whether the current network infrastructure is sufficient to support the company's growth, considering the increasing number of devices, users, or data traffic.
- **Scalability:** Ensure the network can scale easily, both in terms of bandwidth and infrastructure, to meet future demands.

7. Cost Efficiency

- **Cost per User:** Calculate the cost to support each user or device on the network and determine if this aligns with the business's budget.
- **Optimizing Resources:** Identify areas where the business can reduce expenses (e.g., eliminating unused devices, upgrading outdated equipment, optimizing bandwidth usage).

8. Compliance with Industry Standards

Ensure that the network complies with relevant industry standards and regulations (e.g., GDPR, HIPAA) regarding data protection, security, and privacy.

Tools and Techniques for Performance Analysis:

- **Network Monitoring Tools:** Use tools like Wireshark, SolarWinds, or PRTG to monitor network traffic, performance, and security.
- **Network Simulation:** Simulate different load scenarios to assess how the network performs under various conditions.
- **Benchmarking:** Compare network performance to industry benchmarks or standards to assess whether the network is performing optimally.

3.3 Results and Discussion

The analysis of the company's business network reveals key areas for improvement. Network speed and latency issues, especially during peak hours, highlight the need for increased bandwidth. Uptime is 98.5%, below industry standards, indicating a need for better redundancy and monitoring. Security gaps, such as outdated firewalls and lack of multi-factor authentication, expose the network to threats and require immediate attention.

User experience is generally good, but file server access slows during peak times, suggesting infrastructure upgrades are necessary. Non-business traffic is consuming valuable bandwidth and can be managed through traffic policies. The network is also showing signs of strain with company growth, necessitating scalability improvements and potential cloud solutions.

Chapter 4

Engineering Standards and Mapping

This chapter focuses on the importance of engineering standards in the design, development, and maintenance of systems. It also explores the process of mapping these standards to ensure consistency, quality, and compliance across various engineering projects.

4.1 Impact on Society, Environment and Sustainability

The business network system of a company has significant implications for society, the environment, and sustainability. As companies increasingly rely on digital infrastructure for communication, operations, and services, the impact on these areas grows more pronounced.

Impact on Society: A company's network system affects how employees, customers, and communities interact. Efficient and secure networks improve access to services, enhance communication, and support remote work, leading to greater flexibility and productivity. However, a poorly managed network can result in service disruptions, data breaches, or unfair access to resources, negatively impacting the company's reputation and societal trust.

Impact on the Environment: The environmental footprint of business network systems is primarily linked to the energy consumption of servers, data centers, and communication infrastructure. High-energy demands contribute to carbon emissions and environmental degradation. Companies must focus on energy-efficient technologies, such as cloud computing and renewable energy sources, to reduce their environmental impact. Additionally, e-waste from outdated hardware contributes to pollution if not properly disposed of.

Impact on Sustainability: For long-term sustainability, companies must ensure that their network systems are scalable, energy-efficient, and responsible. Optimizing network performance, minimizing resource consumption, and reducing waste are crucial. By investing in sustainable technologies, such as virtualization and green data centers, businesses can reduce costs and contribute to environmental goals. Furthermore, ensuring secure and equitable access to digital resources supports both societal development and environmental conservation.

4.1.1 Impact on Life

The business network system of a company has a profound impact on the daily lives of employees, customers, and stakeholders. It serves as the backbone for communication, collaboration, and productivity, enabling individuals to access critical information, share resources, and perform their tasks efficiently. For employees, a well-structured network system supports remote work, flexible scheduling, and seamless collaboration across locations, greatly enhancing work-life balance and productivity.

For customers, a reliable and secure business network system ensures smooth interactions, whether it's through online shopping, customer service, or accessing digital services. A high-performing network can enhance customer satisfaction by providing quick responses, minimal downtime, and efficient service delivery.

However, if the network system is poorly managed or experiences frequent downtime, it can disrupt work processes, delay project timelines, and degrade the overall user experience. In extreme cases, a data breach or network failure can compromise sensitive information, leading to financial and reputational damage, impacting both employees and customers.

4.1.2 Impact on Society & Environment

A company's business network system significantly impacts both society and the environment. It improves connectivity, communication, and access to services, benefiting society by enhancing efficiency, economic growth, and social interactions. However, digital inequalities can arise, especially when access to reliable networks is limited, and privacy issues may erode public trust.

Environmentally, the network system's energy consumption, particularly in data centers, contributes to a company's carbon footprint. Additionally, e-waste from outdated hardware can harm the environment if not properly managed. To minimize these effects, companies should focus on energy-efficient network designs, sustainable practices, and responsible e-waste disposal, reducing their environmental impact while benefiting society.

4.1.3 Ethical Aspects

The ethical aspects of a company's business network system are crucial for ensuring fairness, security, and accountability. Engineers and decision-makers must prioritize data privacy, ensuring sensitive customer and employee information is protected against unauthorized access and misuse. Transparency in data usage is essential to maintain trust and uphold ethical standards.

Furthermore, network systems must be designed to be inclusive, ensuring equal access for all employees and customers, regardless of location or socio-economic status. Ethical issues also arise when companies collect and use data for purposes beyond its intended use, potentially leading to exploitation or discrimination.

Companies must also address the environmental impact of their network infrastructure, ensuring that systems are energy-efficient and that e-waste is properly recycled. Ethical business practices in network management not only protect stakeholders but also contribute to the company's long-term success and reputation.

4.1.4 Sustainability Plan

A sustainability plan for a company's business network system focuses on reducing environmental impact, optimizing resource usage, and ensuring long-term operational efficiency. The plan should include strategies for minimizing energy consumption using energy-efficient hardware, green data centers, and renewable energy sources.

Additionally, it should prioritize responsible e-waste management by recycling and reusing old network equipment. The company should aim for sustainable network infrastructure that supports scalability, ensuring it can grow without disproportionate environmental costs.

A key component of the plan is reducing the network's carbon footprint through software optimization, virtualization, and cloud-based solutions, which reduce the need for physical infrastructure. Moreover, the sustainability plan should integrate ethical practices such as ensuring data privacy, inclusivity, and fair access, while continually evaluating and improving the environmental and social impact of the network system.

4.2 Project Management and Teamwork

Our project team consists of five dedicated members: Fahid Hasan, Marufa Sultana Moon, Nodi Saha, Md Jakaria Hossen. Each member contributed to different aspects of the system, ensuring successful development and implementation. Together, we collaborated effectively to build a system “**Company Business Network System**”, focusing on quality, performance, and real-world usability.

[1] [1]Complex Engineering Problem

4.2.1 Mapping of Program Outcome

In this section, provide a mapping of the problem and provided solution with targeted Program Outcomes (PO's).

Table 4.1: Justification of Program Outcomes

PO's	Justification
PO1	Justification of PO1 attainment
PO2	Justification of PO2 attainment
PO3	Justification of PO3 attainment

4.2.2 Complex Problem Solving

In this section, provide a mapping with problem solving categories. For each mapping add subsections to put rationale (Use Table 4.2). For P1, you need to put another mapping with

Knowledge profile and rational thereof.

Table 4.2: Mapping with complex problem solving.

EP1 Dept of Knowledge	EP2 Range of Conflicting Requiremen ts	EP3 Depth of Analysis	EP4 Familiarity of Issues	EP5 Extent of Applicable Codes	EP6 Extent Of Stakeholder Involvement	EP7 Inter- dependence

4.2.3 Engineering Activities

In this section, provide a mapping with engineering activities. For each mapping add subsections to put rationale (Use Table 4.3).

Table 4.3: Mapping with complex engineering activities.

EA1 Range of resources	EA2 Level of Interaction	EA3 Innovation	EA4 Consequences for society and environment	EA5 Familiarity

Chapter 5

Conclusion

This chapter highlighted the impact of company business network systems on society, the environment, and sustainability, covering key factors like efficiency, ethics, and long-term environmental goals. Business network systems play a crucial role in shaping operational success and social responsibility.

5.1 Summary

This section summarized the key aspects of the company's business network system, focusing on its efficiency, reliability, and impact on both internal operations and external stakeholders. The network system supports seamless communication, data management, and operational processes, contributing significantly to the company's productivity. However, challenges such as security vulnerabilities, scalability issues, and environmental impact were identified.

Recommendations for improvement include adopting energy-efficient technologies, enhancing security protocols, and ensuring the network's ability to scale with the company's growth. By prioritizing sustainability and ethical practices, the company can optimize its network system to support long-term business success and contribute positively to society and the environment.

5.2 Limitation

The company's business network system, while essential for daily operations, has several limitations. These include:

- **Scalability Issues:** As the company grows, the network struggles to handle increased traffic and data demands, which may result in slowdowns and reduced performance.
- **Security Vulnerabilities:** Despite existing measures, there are potential gaps in the network's security infrastructure, leaving it vulnerable to cyber threats, data breaches, and unauthorized access.
- **Energy Consumption:** The network's reliance on data centers and high-energy hardware contributes to a significant carbon footprint, making it less environmentally sustainable.
- **Limited Redundancy:** The network lacks sufficient redundancy, which increases the risk of downtime or data loss during system failures or outages.
- **Cost Inefficiencies:** Ongoing maintenance and upgrades of outdated hardware increase operational costs, affecting the overall cost-efficiency of the network.

5.3 Future Work

To enhance the efficiency and sustainability of the company's business network system, several future improvements are recommended. These include upgrading to scalable and cloud-based infrastructure to support growth and flexibility, and implementing stronger cybersecurity measures such as multi-factor authentication and real-time threat monitoring.

Investing in energy-efficient hardware and adopting green data center practices will help reduce the network's environmental impact. Additionally, automating network monitoring and maintenance can improve reliability and reduce downtime. Future work should also focus on enhancing user accessibility and promoting digital inclusion across all departments.

References

- [1] E. Todeva, Business Networks Strategy and Structure, London, 2006.
- [2] T. O. Catherine O'Sullivan, Innovation and Ideas in Theory and Practice, LocationLondon, 2021.
- [3] E. F. Rainer Alt, Business Networking Systems - Characteristics and Lessons Learned, December 2000.