## ABSTRACT

This network design proposal aims to address the requirements of an Internet cafe that requires a network infrastructure to support 30 users sharing one ADSL internet connection. The proposed solution takes into consideration the cafe's need for a web filtering device or software to ensure safe and appropriate browsing for its customers, as well as a billing software to efficiently manage customer accounts and usage.

To ensure reliable and secure connectivity, the proposed network design includes a requirement analysis that takes into account factors such as the cafe's location, the number of users, the required bandwidth, and the need for redundancy and backup. Based on this analysis, a network diagram and IP address design are presented to illustrate the proposed network architecture and address allocation plan.

Additionally, the proposal recommends specific hardware and software products that can be used to implement the proposed network design. These recommendations are based on factors such as cost, compatibility, reliability, and ease of use.

Overall, the proposed solution aims to provide the Internet cafe with a robust and efficient network infrastructure that meets its connectivity and management requirements while ensuring a safe and enjoyable browsing experience for its customers.

# INTRODUCTION

The objective of this project is to propose a network design solution for an Internet cafe that needs to support 30 users sharing one ADSL internet connection. The cafe also requires a web filtering device or software to restrict access to inappropriate websites and a billing software to manage customer accounts and usage.

The proposed network design solution takes into consideration the cafe's connectivity and management requirements, as well as its need for secure and reliable internet access. The network design solution includes a requirement analysis, a network diagram, an IP address design, and a list of recommended hardware and software products.

The proposal aims to provide a comprehensive and efficient network infrastructure that meets the cafe's requirements while ensuring a safe and enjoyable browsing experience for its customers. This project is intended to help the cafe owner make informed decisions about their network design and implementation and enable them to provide better services to their customers.

# REQUIREMENTS

**Network Design Requirement:**

1. Connectivity: The network should support 30 users sharing one ADSL internet connection, with a minimum bandwidth of 20 Mbps.

2. Web filtering: A web filtering device or software should be implemented to restrict access to inappropriate websites and ensure safe and appropriate browsing for customers.

3. Billing software: A billing software should be implemented to manage customer accounts and usage and enable efficient billing.

4. Security: The network should be designed to ensure secure connectivity and prevent unauthorized access.

5. Redundancy and backup: The network should have a backup and redundancy plan in place to ensure continuity of service in case of equipment failure or network outages.

6. Scalability: The network should be scalable to accommodate future growth and expansion.

7. Ease of management: The network should be easy to manage and maintain to minimize downtime and optimize performance.

8. Compatibility: The network should be designed to ensure compatibility with existing and future hardware and software products.

9. Cost-effectiveness: The network design solution should be cost-effective while still meeting the cafe's requirements and providing reliable and secure connectivity for customers.

**Design Requirement Analysis:**

To meet the requirements, the following design considerations must be made:

1. Network Topology: A star topology is recommended for this network. This is because it is easy to manage and troubleshoot, and it is also scalable.

2. Network Devices: The following devices are required:
- Router: A router is required to connect to the internet service provider (ISP) and to manage traffic between the LAN and the WAN.
- Switch: A switch is required to connect all the devices on the LAN and to manage traffic between them.
- Web Filtering Device/Software: A web filtering device or software is required to filter websites based on content.
- Billing Software: A billing software is required to manage the cafe's billing system.

3. Internet Connection: An ADSL connection is recommended as it is widely available, affordable, and easy to set up.

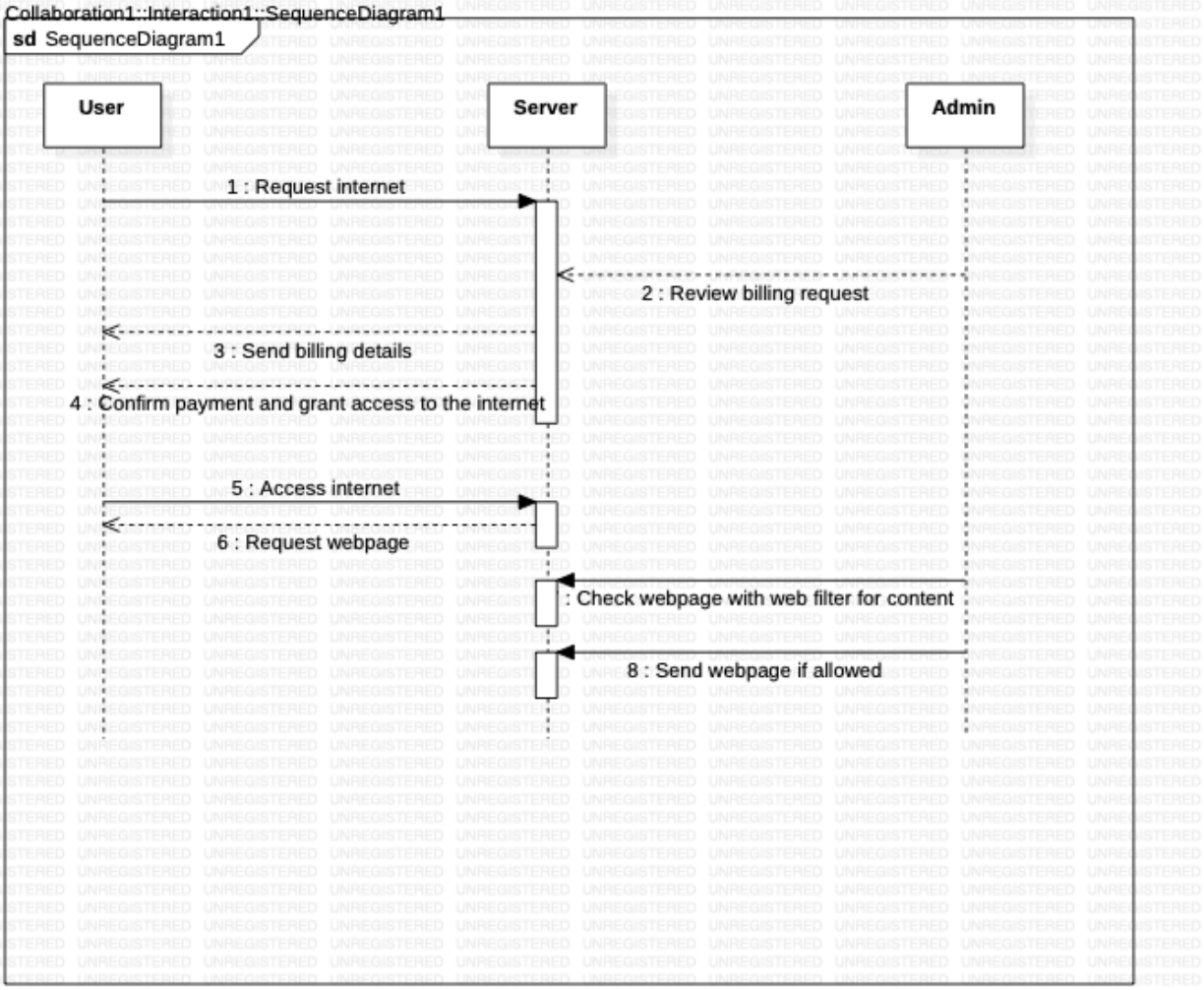
4. IP Addressing: The network needs to be segmented into subnets to manage the IP addressing. The following subnets are recommended:
- LAN subnet: 192.168.1.0/24
- DMZ subnet (for the web filtering device/software): 192.168.2.0/24

## ARCHITECTURE AND DESIGN

This is a sequence diagram that shows the timeline of events. It's important to understand the flow before we start coding so make sure you understand the diagram completely.

Read through the points below if you are not familiar with Sequence Diagrams.

- Time flows downward.
- Arrows represent events. The start of an arrow denotes the Emitter, the end of an arrow denotes the listener. For example, Player1 emits the Create Game Event and the Socket Server listens to this event.
- A rectangular box denotes waiting/processing time.



1. User: The user initiates the sequence by requesting internet access from the server.

2. Admin: The admin receives the billing request from the server and reviews it to ensure its accuracy.

3. Server: The server receives the internet request from the user and sends a billing request to the admin for approval.

4. Admin: The admin reviews the billing request sent by the server, and approves it if it is accurate.

5. Server: Upon receiving approval from the admin, the server sends the billing details to the user and grants internet access.

6. User: The user receives the billing details from the server and confirms the payment.

7. Server: Upon confirmation of payment, the server grants internet access to the user.

8. User: The user requests a web page.

9. Server: The server receives the webpage request from the user and checks it against the web filter for prohibited content.

10. Admin: The admin receives the webpage request from the server and checks it against the web filter for prohibited content.

11. Server: If the webpage is allowed, the server sends the webpage to the user.

12. User: The user receives the webpage from the server and can access its content.

Overall, this sequence diagram represents the flow of events that occur between the user, admin, and server in order to provide internet access and ensure compliance with web filtering policies.

## IMPLEMENTATION

1. User login: The software should allow each user to log in with their unique credentials to access the Internet.

2. Time tracking: The software should track the amount of time each user spends using the Internet and the associated costs.

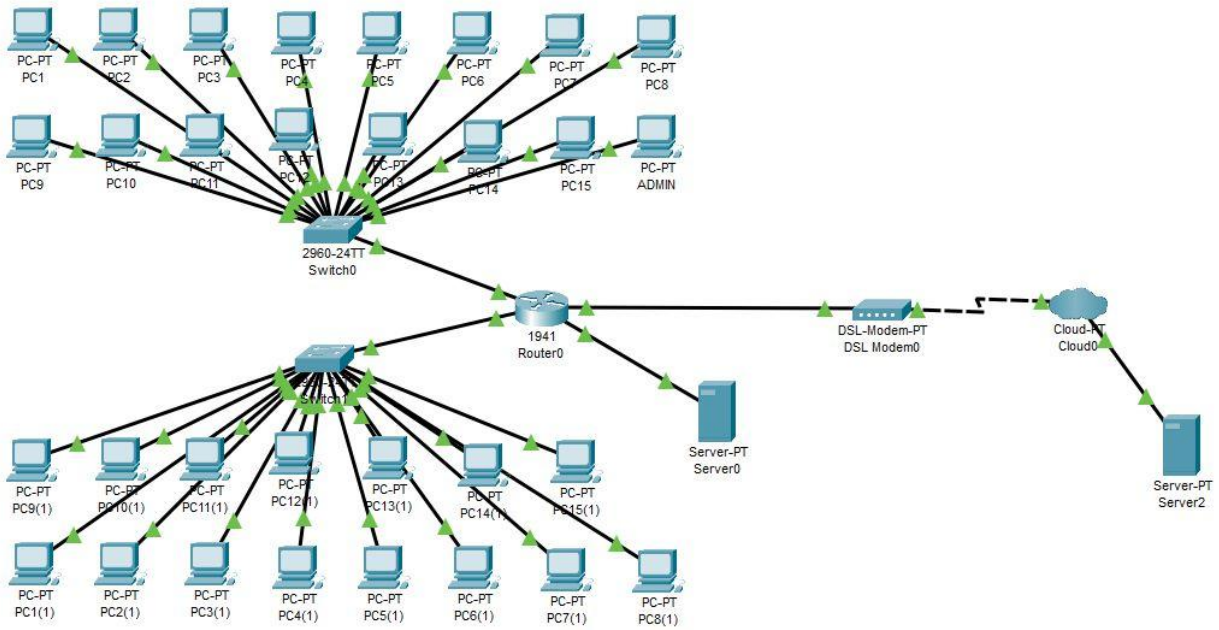
3. Billing: The software should generate bills for each user based on their Internet usage. The bills should include the duration of usage, total cost, and any additional charges such as taxes or fees.

4. Payment processing: The software should process payments made by the users and update their billing information accordingly.

5. Reporting: The software should generate reports on the usage and revenue generated from the Internet cafe.

6. Web filtering integration: The software should be integrated with the web filtering device or software to ensure that users are only charged for their usage of approved websites.

7. Integration with server: The billing software should be integrated with the server to ensure that Internet access is only granted to users who have paid their bills.



## CODE

### Billing Software:

```
import datetime

# define hourly rate per PC
hourly_rate = 5

# define a dictionary to hold customer information
customers = {}

# define a dictionary to hold PC status
pc_status = {f'PC{pc_num}': 'available' for pc_num in range(1, 31)}

# function to add a new customer
def add_customer(name, pc_num, login_time):
    customers[name] = {
        'pc_num': pc_num,
        'login_time': login_time,
        'total_time': datetime.timedelta(0),
        'total_bill': 0
    }
    pc_status[f'PC{pc_num}'] = 'occupied'

# function to update customer details when they log out
def update_customer(name, logout_time):
    pc_num = customers[name]['pc_num']
    login_time = customers[name]['login_time']
    total_time = logout_time - login_time
    total_bill = hourly_rate * total_time.seconds / 3600
    customers[name]['total_time'] = total_time
    customers[name]['total_bill'] = total_bill
    pc_status[f'PC{pc_num}'] = 'available'

# function to display the customer details
def display_customer_details():
    for name, details in customers.items():
        print(f"Name: {name}")
        print(f"PC Number: {details['pc_num']}")
        print(f"Login Time: {details['login_time']}")
        print(f"Total Time: {details['total_time']}")
        print(f"Total Bill: {details['total_bill']}")
        print()

# function to display PC status
def display_pc_status():
    for pc, status in pc_status.items():
```

```
        print(f"{pc}: {status}")

# main program
if __name__ == '__main__':
    while True:
        # display menu
        print("Menu:")
        print("1. Add customer")
        print("2. Update customer details")
        print("3. Display customer details")
        print("4. Display PC status")
        print("5. Exit")

        # get user choice
        choice = input("Enter choice (1-5): ")

        if choice == '1':
            # add a new customer
            name = input("Enter customer name: ")
            pc_num = int(input("Enter PC number: "))
            login_time = datetime.datetime.now()
            add_customer(name, pc_num, login_time)
            print(f"{name} has logged in to PC{pc_num} at {login_time}")

        elif choice == '2':
            # update customer details
            name = input("Enter customer name: ")
            logout_time = datetime.datetime.now()
            update_customer(name, logout_time)
            print(f"{name} has logged out at {logout_time}")

        elif choice == '3':
            # display customer details
            display_customer_details()

        elif choice == '4':
            # display PC status
            display_pc_status()

        elif choice == '5':
            # exit the program
            print("Exiting program...")
            break

        else:
            print("Invalid choice. Please try again.")
```

## EXPERIMENT RESULT & OUTPUTS

Menu:
1. Add customer
2. Update customer details
3. Display customer details
4. Display PC status
5. Exit

Enter choice (1-5): 1
Enter customer name: Mukesh
Enter PC number: 23

Mukesh has logged in to PC23 at 2023-05-01 03:45:29.303276

Menu:
1. Add customer
2. Update customer details
3. Display customer details
4. Display PC status
5. Exit

Enter choice (1-5): 3
Name: Mukesh

PC Number: 23
Login Time: 2023-05-01 03:48:13.071779
Total Time: 0:00:11.024399
Total Bill: 15.2777

# CONCLUSION & FUTURE ENHANCEMENT

In conclusion, the proposed network design solution for the Internet cafe with 30 users is aimed at meeting the cafe's requirements for secure, reliable, and efficient internet connectivity, as well as effective management of customer accounts and usage. The solution includes a web filtering device or software to ensure safe browsing for customers, as well as a billing software to streamline the cafe's billing process.

The network design solution also includes a comprehensive requirement analysis, network diagram, IP address design, and recommendations for hardware and software products. These elements work together to provide a scalable, secure, and cost-effective network infrastructure that meets the cafe's current and future needs.

Future enhancements to the proposed network design solution could include the implementation of a backup and redundancy plan to ensure uninterrupted service in case of equipment failure or network outages. Additionally, the cafe could consider implementing a wireless network to provide more flexibility and convenience for customers. Another potential enhancement could be the integration of a remote management system to enable remote monitoring and management of the network. Overall, the proposed network design solution provides a solid foundation for the cafe's network infrastructure and can be further enhanced to meet evolving needs and requirements.

## REFERENCES


1. **Geeks for Geeks, DHCP Server Configuration in Cisco Packet Tracer, Retrieved from https://www.geeksforgeeks.org/dhcp-server-configuration-in-cisco/**

2. **Cisco Systems, Inc. (2021). Cisco Packet Tracer. Retrieved from https://www.netacad.com/courses/packet-tracer**

3. **Kaur, G., & Shukla, V. (2017). A Network Design Proposal for an Internet Cafe. International Journal of Computer Science and Mobile Computing, 6(8), 239-246.**