Network design proposal for small office

A COURSE PROJECT REPORT
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BONAFIDE CERTIFICATE

This is to certify that **18CSC202J – COMPUTER COMMUNICATION Course Project report** is the bonafide work of **Rupesh Roshan Sahoo (RA2111028010194), I Aditya Kumar(RA2111028010175),Debashis Praharaj(RA2111028010181),II B.Tech(Cloud-Computing)** who undertook the task of completing the project within the allotted time.

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ABSTRACT

The proposed network design aims to provide a reliable and efficient solution for a small office with 5 users and an ADSL internet connection. The network will be designed to accommodate the current needs of the office while also allowing for future expansion.
The network will consist of a router, which will provide internet connectivity to all devices on the network, and a switch to connect all devices in the office. The switch will be connected to the router, and all devices will be connected to the switch.
The network will also include a parallel port printer, which will be connected to one of the devices on the network. This will allow all users on the network to print documents from their devices.
The network will be secured with a firewall to prevent unauthorized access, and all devices will be configured with the necessary security protocols to ensure the safety and privacy of data.
Overall, the proposed network design will provide a reliable and efficient solution for a small office with 5 users and an ADSL internet connection, while also allowing for future expansion and growth.

Introduction

In today's digital age, having a reliable and secure network infrastructure is essential for any organization, regardless of its size. For a small office with 5 users, an ADSL internet connection, and a parallel port printer, a robust network is critical to ensure seamless operations and efficient collaboration. Therefore, this network design proposal aims to provide a scalable and secure network solution that meets the office's current and future needs. The proposal outlines the project requirements, including internet access for all users, network printing capabilities, secure wireless access, a file server, hosted email servers, and remote access for the administrator. The report contents include hardware requirement analysis, network topology diagram, network integration analysis, IP network design, TCP/IP configuration for the clients, and services and features. The implementation plan and timeline, testing and validation procedures, documentation, and training and support plan for the office staff are also included in the report. This network design proposal will be delivered using Cisco Packet Tracer and aims to provide the small office with a reliable and efficient network infrastructure that can support its day-to-day operations and future growth..

Project Scope:

The scope of this project is to design and implement a reliable and secure network infrastructure for a small office with 5 users, an ADSL internet connection, and a parallel port printer. The project aims to provide the following services to the office:

1. Internet access for all users through the ADSL connection.
2. Network printing capabilities through the parallel port printer.
3. Secure wireless access for all users, with the flexibility to connect via LAN.
4. A file server for sharing files on the network.
5. Hosted email servers for email access.
6. Remote access for the administrator to view and control the file server from any location on the internet.

The project scope also includes an analysis of the hardware requirements, network topology, IP network design, and TCP/IP configuration for the clients. The project aims to provide a scalable and efficient network infrastructure that meets the office's current and future needs. The implementation plan and timeline, testing and validation procedures, documentation, and training and support plan for the office staff are also included in the project scope. The project will be delivered using Cisco Packet Tracer, and the final solution will be thoroughly tested and validated to ensure that it meets the project requirements and the office's expectations.

Objective

The objectives for the network design proposal for a small office are:

1. To provide reliable internet access for all 5 users through the ADSL connection.
2. To enable network printing capabilities via the parallel port printer.
3. To ensure secure wireless access for all users, with the flexibility to connect via LAN.
4. To implement a file server for sharing files on the network.
5. To set up hosted email servers for email access.
6. To provide remote access for the administrator to view and control the file server from any location on the internet.
7. To analyze the hardware requirements and select appropriate equipment for the network.
8. To design a network topology that meets the project requirements.
9. To implement the necessary services, features, and technologies for network integration.
10. To design an IP network that provides efficient routing and address management
11. To configure TCP/IP for the clients.
12. To provide a comprehensive requirement analysis and solution explanation.
13. To identify the necessary software and hardware for the network infrastructure.
14. To create an implementation plan and timeline for the project.
15. To conduct testing and validation procedures to ensure that the final solution meets the project requirements.
16. To provide documentation and training for the office staff.
17. To develop a support plan to address any issues that may arise post-implementation.
18. To deliver the project using Cisco Packet Tracer, a network simulation tool.

Requirements:

Hardware Requirements:
- ADSL modem
- Wireless router
- Ethernet switch
- File server with adequate storage capacity
- Parallel port printer or printer server
- Desktop computers or laptops with wireless and Ethernet capabilities
- Access points for wireless connectivity
- Patch cables and power cables

Network Requirements:
- Internet connectivity through ADSL modem
- Wireless connectivity with WPA2 security
- LAN connectivity with Ethernet switch
- File sharing through the file server
- Printing capabilities via the parallel port printer
- Email access through hosted email servers
- Remote access to the file server through VPN or other secure means

Network Planning

network planning for the network design proposal for a small office:

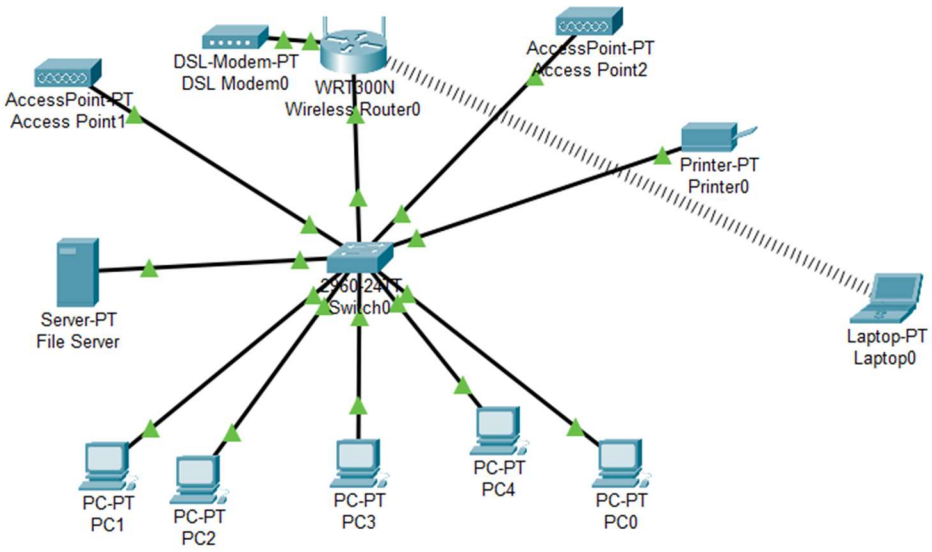
1. Determine the network topology: The network topology will depend on the office layout, number of users, and their requirements. A star topology, where all devices are connected to a central switch or router, is a good option for small offices.
2. Determine the IP addressing scheme: Assigning unique IP addresses to devices on the network is important for proper communication and management. It is recommended to use a private IP addressing scheme, such as 192.168.x.x or 10.x.x.x.
3. Configure the ADSL modem: The ADSL modem should be configured according to the internet service provider's instructions. The modem should be connected to the WAN port of the wireless router.
4. Configure the wireless router: The wireless router should be configured to provide wireless and LAN connectivity. The router should be connected to the ADSL modem and the Ethernet switch.
5. Configure the file server: The file server should be set up with proper permissions and security measures to ensure that only authorized users have access to files.
6. Configure the parallel port printer: The parallel port printer should be connected to the Ethernet switch using a printer server or a direct connection to a computer.
7. Set up email servers: Hosted email servers can be set up to provide email access to all users.
8. Set up remote access: The file server should be configured to allow remote access for the administrator through VPN or other secure means.
9. Test the network: The network should be tested to ensure that all devices are properly connected and configured. Any issues should be addressed and resolved.

IP network design

IP network design table for the proposed network design for a small office:

Device	IP Address	Subnet Mask	Default Gateway
ADSL Modem	192.168.1.1	255.255.255.0	N/A
Wireless Router	192.168.1.2	255.255.255.0	192.168.1.1
Ethernet Switch	192.168.1.3	255.255.255.0	192.168.1.1
File server	192.168.1.4	255.255.255.0	192.168.1.1
Printer	192.168.1.5	255.255.255.0	192.168.1.1
Access Point 1	192.168.1.6	255.255.255.0	192.168.1.1
Access Point 2	192.168.1.7	255.255.255.0	192.168.1.1
DHCP Server	192.168.1.100	255.255.255.0	192.168.1.1
User1	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP
User2	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP
User3	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP
User4	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP
User5	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP
Laptop(wl)	Assigned by DHCP	Assigned by DHCP	Assigned by DHCP

Network Topology Diagram



Network Integration Analysis

The following network integration analysis can be made:

1. Network Topology: A star topology has been chosen for the small office network. This topology provides a central point of control, making it easy to manage and troubleshoot the network.

2. IP Addressing: The office network will use a private IP addressing scheme, such as 192.168.x.x or 10.x.x.x. This scheme provides enough IP addresses for all devices on the network and helps ensure proper communication and management.

3. ADSL Modem Configuration: The ADSL modem will be configured according to the internet service provider's instructions. The modem will be connected to the WAN port of the wireless router to provide internet connectivity.

4. Wireless Router Configuration: The wireless router will be configured to provide wireless and LAN connectivity. The router will be connected to the ADSL modem and the Ethernet switch to provide access to the internet and network resources.

5. File Server Configuration: The file server will be set up with proper permissions and security measures to ensure that only authorized users have access to files.

6. Printer Configuration: The parallel port printer will be connected to the Ethernet switch using a printer server or a direct connection to a computer. This will provide all users with access to the printer.

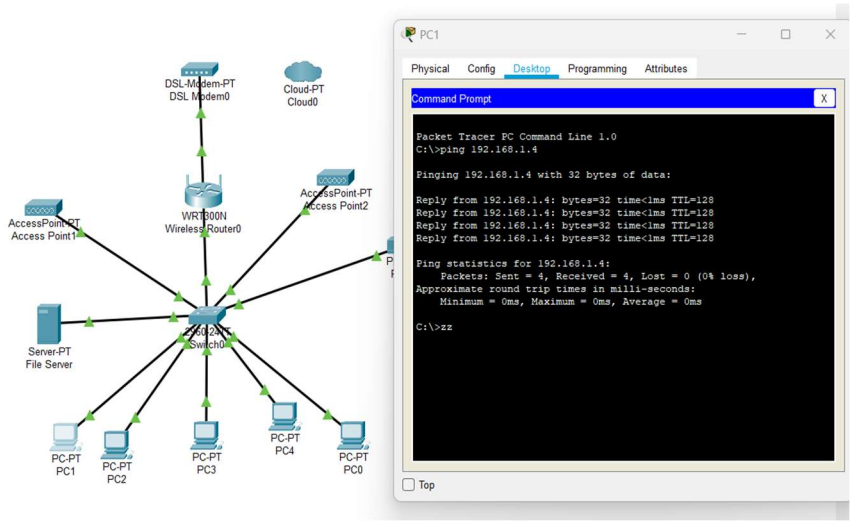
7. Email Server Configuration: Hosted email servers will be set up to provide email access to all users.

8. Remote Access Configuration: The file server will be configured to allow remote access for the administrator through VPN or other secure means. This will enable the administrator to remotely view and control the file server from any location on the internet.

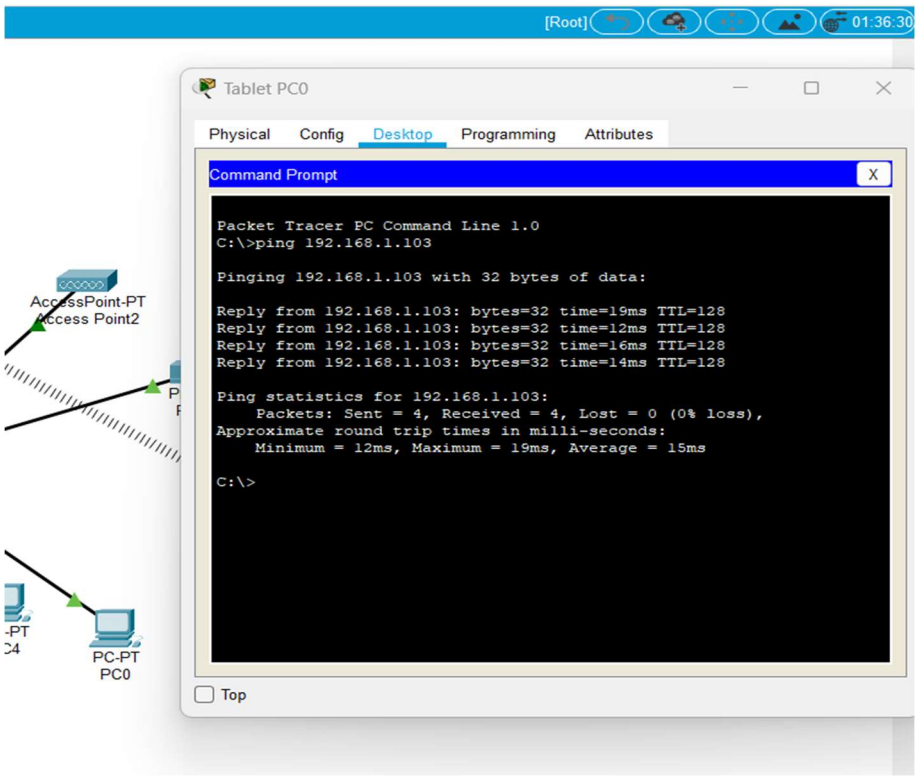
9. 9. Network Testing: The network will be tested to ensure that all devices are properly connected and configured. Any issues will be addressed and resolved to ensure the network is running smoothly.

In summary, the network integration analysis shows that the small office network has been designed with security, scalability, and ease of management in mind. With proper configuration and testing, this network will provide the necessary services and features required for the office's daily operations.

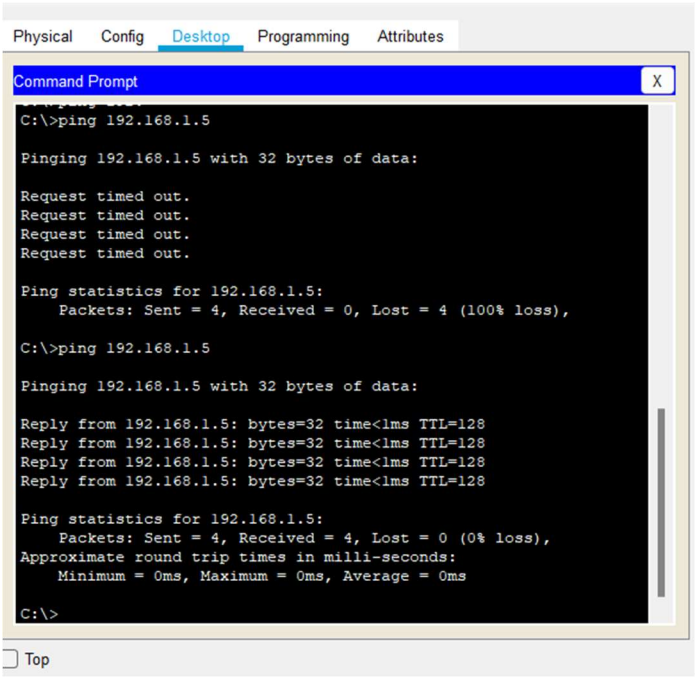
TCP/IP CONFIG OF CLIENT:



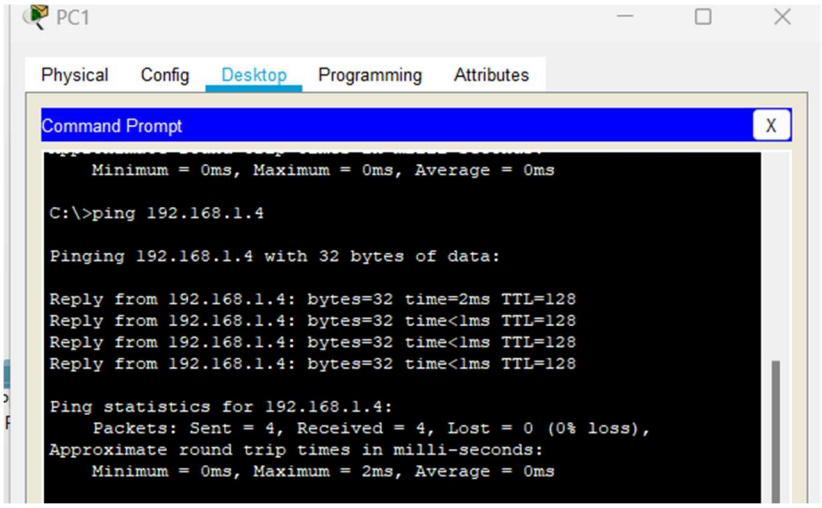
WIRELESS DEVICE CONECTION TO THE SYSTEM:



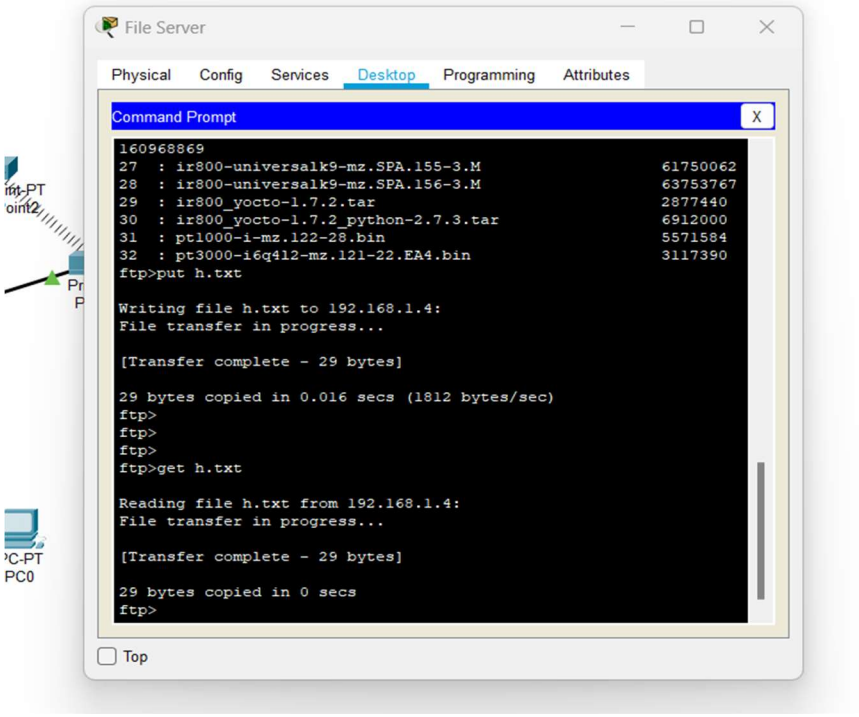
PRINTER WORKING:



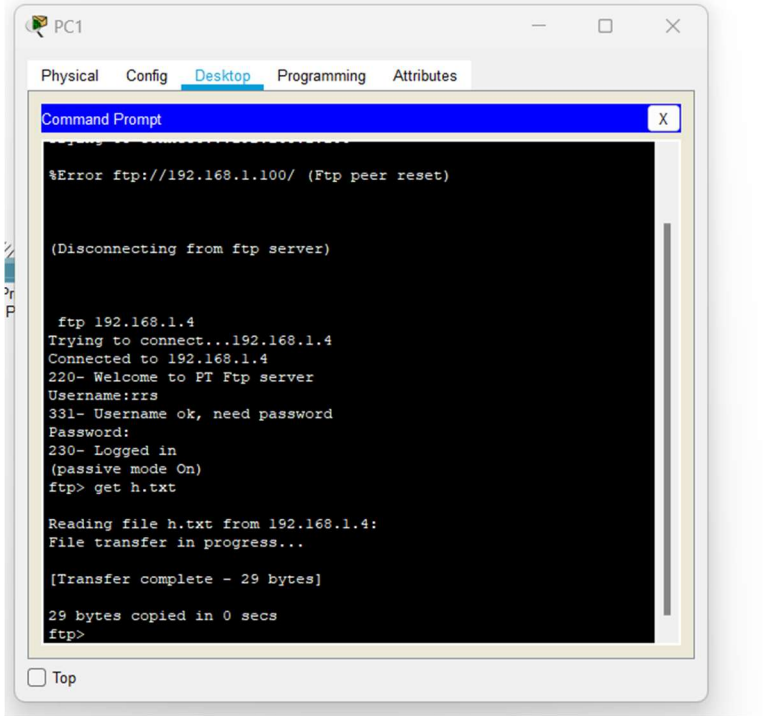
FILE SERVER :



File transfer (uploading file):



Getting file From the Server through PC1:



Requirement Analysis:

The first step is to determine the requirements of the office. In this case, we have a small office with multiple users who need access to the internet, file sharing, and printing services. The network should be secure and easy to manage. There should also be the flexibility to connect via LAN and wireless access.

Solution Explanation:

Based on the requirements, the following solution is proposed:
1. Network Topology: A star topology is proposed as it is easy to manage and expand. All devices will be connected to a central switch or router, which will act as the gateway to the internet.
2. IP Addressing Scheme: A private IP addressing scheme, such as 192.168.x.x or 10.x.x.x, will be used to assign unique IP addresses to devices on the network.
3. ADSL Modem: The ADSL modem will be configured according to the internet service provider's instructions. The modem will be connected to the WAN port of the wireless router.
4. Wireless Router: The wireless router will be configured to provide wireless and LAN connectivity. The router will be connected to the ADSL modem and the Ethernet switch.

5. File Server: The file server will be set up with proper permissions and security measures to ensure that only authorized users have access to files. The administrator will have remote access to the server through VPN or other secure means.
6. Printer: The parallel port printer will be connected to the Ethernet switch using a printer server or a direct connection to a computer.
7. Hosted Email Servers: Hosted email servers will be set up to provide email access to all users.
8. DHCP Server: A DHCP server will be set up to automatically assign IP addresses, subnet masks, and default gateways to clients on the network.
9. Access Points: Access points will be used to provide wireless access to the network. Two access points will be used to ensure complete coverage.
10. Security: Firewalls and other security measures will be implemented to protect the network from unauthorized access.
11. Network Management: Proper network management tools and techniques will be used to monitor and manage the network.

Services And Features

Based on the project requirements, the following services and features are needed in the network design:

1. Internet Access: The network must be connected to the internet to provide access to online resources.

2. Wireless Access: All users should have secure wireless access to the network, with the flexibility to connect via LAN

3. 3. File Sharing: A file server should be set up with proper permissions and security measures to ensure that only authorized users have access to files.

4. Printer Sharing: The parallel port printer should be connected to the Ethernet switch using a printer server or a direct connection to a computer.

5. Email Access: Hosted email servers can be set up to provide email access to all users.

6. Remote Access: The file server should be configured to allow remote access for the administrator through VPN or other secure means.

7. DHCP: A DHCP server should be configured to assign IP addresses to devices on the network automatically.

8. Network Security: The network should be secured with proper firewall and anti-virus software to prevent unauthorized access and protect against malware and other threats.

9. Network Monitoring: The network should be monitored regularly to identify any issues and ensure optimal performance.

10. Network Backup: A backup solution should be implemented to prevent data loss in case of hardware or software failure.

11. VLANs: VLANs can be configured to group devices based on their function or department, providing better network management and security.

12. Quality of Service (QoS): QoS can be configured to prioritize network traffic based on the needs of different applications, ensuring optimal performance and minimizing network congestion.

Conclusion

The proposed solution is designed to meet the requirements of the small office network while ensuring security and ease of management. It provides users with both LAN and wireless access to the network, file sharing, printing, and email services. Proper security measures are implemented to protect the network from unauthorized access. The network is easy to manage using proper network management tools and techniques.