**NETWORK SECURITY AND OPTIMAZATION**

**Project Title:** Secure Small Office Home Office (SOHO) Network for a Law Firm

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**Tool Used:** Cisco Packet Tracer

**INTRODUCTION**A local law firm has been experiencing significant network-related challenges, including slow speeds, frequent disconnections, and security vulnerabilities.   
Their previous network was outdated, lacked segmentation, and had poor security implementations, making it susceptible to both internal inefficiencies and external cyber threats.  
To sort these issues I set up a structured SOHO network that includes proper segmentation, automated IP address assigning, and enhanced security features.

**OBJECTIVES**

* Improve network performance reduce bottlenecks.
* Implement automated IP management using DHCP.
* Introduce DNS service to minimize unnecessary external request.
* Increase security and segmentation to mitigate cyber threats.

**NETWORK TOPOLOGY**

**Devices Used:**

* 3560-24PS Multilayer Switch (Main Switch)
* 4x 2960-24TT Switches (Departmental Switch)
* 2x Servers (DNS & DHCP)
* Endpoints or Users Devices:   
  7x Laptops

6x PCs

**Network Segmentation:**

* IT Department
* HR Department
* Finance Department
* Admin Department

I connected each department is connected via a managed switch, ensuring proper traffic control and reducing network congestion.

**IMPLEMENTATION**

**DHCP Server Configuration:**

* The DHCP server was configured to automate IP address allocation, ensuring no manual IP conflicts and efficient IP management.
* Used DHCP server default gateway to be 192.168.2.1

**DNS Server Configuration:**

* The DNS server was introduced to reduce external queries to the internet.
* DNS Server IP was default at 192.168.2.3

**End-Point Devices Configuration:**

* Introduced automated IP addresses assigning for each end-Point Devices.
* Stating IP address is 192.168.2.4 to avoid repetition of address.

**VLAN Segmentation and Security:**

To enhance security, the network was segmented into VLANs, Isolating traffic between departments to:

* Prevent unauthorized access.
* Improve performance by reducing traffic.
* Enable organization to scale their networks more easily.

**Network Redundancy & Performance Optimization:**

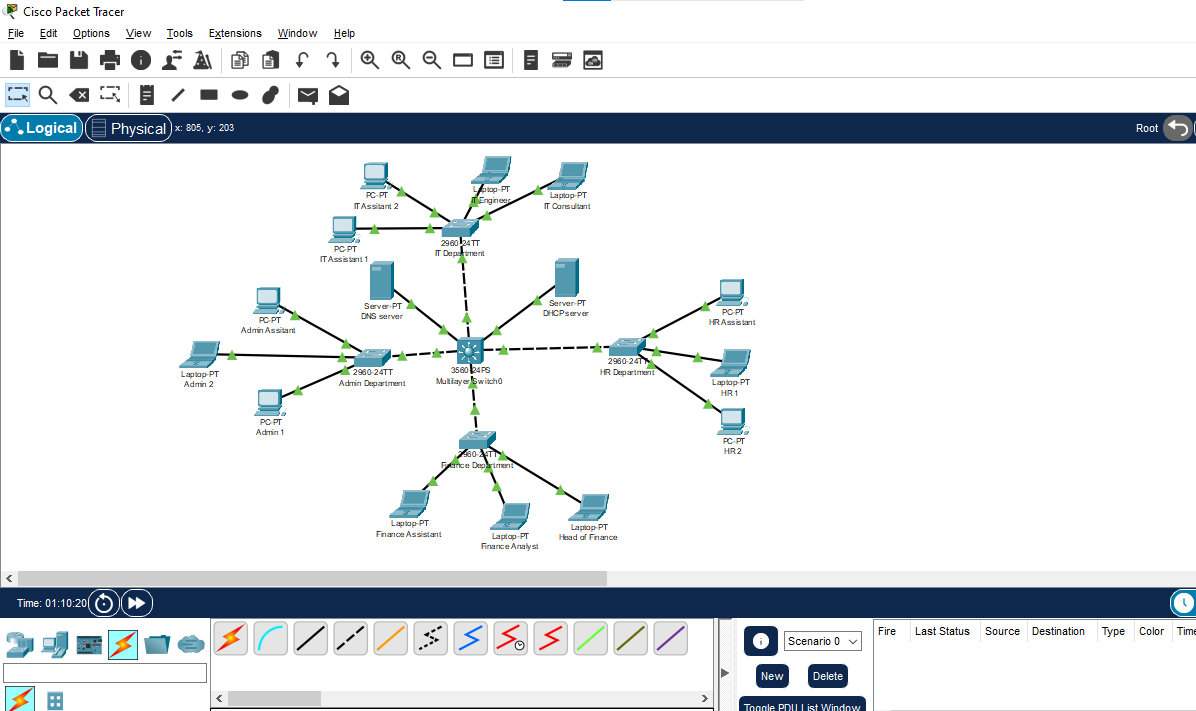
* Implement optimized inter VLAN communication.
* Efficient routing mechanisms for faster data transfer.
* Minimal broadcast to avoid traffic congestions.

**IMPROVEMENT & KEY BENEFITS**

* Faster network speeds due to optimized traffic flow.
* Automated IP addresses for better efficiency.
* Reduced external vulnerabilities by utilizing an internal DNS server.
* Improved security through proper segmentation and access control.
* More scalable and efficient network infrastructure for future expansion.

**CONCLUSION**

The newly designed SOHO network significantly improves performance, security, and scalability for law firm. By implementing DHCP, DNS, VLANs, and optimized routing, the network is now more efficient, stable, and secure. Future enhancement will continue to strengthen the law firm’s cybersecurity posture.

**NETWORK DIAGRAM**