

**Computer Network (lab)**

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**Lab 10:**

### ****Deliverables for Network Design Project****

**Project Title:** Research and Design of a Scalable Organizational Network

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### ****Research Topics for the Project****

#### 1. ****Network Infrastructure Design****

* Understanding the physical and logical topology required for the organization.
* Research on routers, switches, and access points that balance performance and scalability.
* Examining the importance of multi-layer switches (MSWs) in enterprise networks.

#### 2. ****IP Addressing and Subnetting****

* Designing IP address allocation plans using subnetting to optimize utilization.
* Implementing CIDR (Classless Inter-Domain Routing) to conserve address space.

#### 3. ****Network Services and Protocols****

* Configuring essential network services like DHCP for automatic IP assignment and DNS for name resolution.
* Research on VLANs for logical network segmentation.
* Studying routing protocols like RIP, OSPF, and EIGRP to manage interdepartmental traffic effectively.

#### 4. ****Security Features****

* Techniques for securing the network using firewalls, VPNs, and access control lists (ACLs).
* Research on detecting and mitigating potential security threats.

#### 5. ****Testing and Simulation Tools****

* Study of Cisco Packet Tracer and other network simulation tools for testing the design.
* Implementing diagnostic tools such as ping tests and traceroute commands for verification.

#### 6. ****Scalability and Future Growth****

* Researching modular designs to allow seamless future expansion.
* Incorporating redundancy mechanisms, like link aggregation and failover, for improved reliability.

### ****Deliverables for the Project****

#### ****1. Organization Name****: ****XYZ Corporation****

#### ****2. Number of Floors****: ****3****

#### ****3. Number of PCs/Servers in the System****:

* **PCs**: 19 (distributed across departments).
* **Servers**: 3 (dedicated DHCP server, file server, and web server).

#### ****4. Project Objectives****

* Design and implement a robust, scalable, and secure network.
* Ensure smooth interdepartmental communication.
* Incorporate future-proofing for organizational growth.

#### ****5. Tools to Be Used****

* Cisco Packet Tracer for network simulation and testing.

#### ****6. Implementation Steps****

1. Conduct a detailed analysis of the organization's network requirements.
2. Develop a logical and physical topology diagram.
3. Configure network devices and verify inter-device communication using simulation tools.
4. Test DHCP, routing, and security configurations to ensure functionality.