

Institution Networking System

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**Introduction**

This project involves setting up and configuring a comprehensive networking system within an institutional environment. The implementation covers various networking devices, concepts, and protocols to ensure efficient and secure communication across the network.

**Networking Devices**

* **Switches:** Used for connecting multiple devices within the same network and facilitating communication by managing data traffic efficiently.
* **Routers:** Direct data packets between different networks, enabling communication between devices on separate subnetworks.
* **PCs (Personal Computers):** End-user devices connected to the network for accessing resources and communication.
* **Server:** A dedicated machine providing resources, data, and services to other computers within the network.
* **Cables:**
  + Crossover cables
  + Serial DCE (Data Communications Equipment) cables
  + Straight-through cables

**Implemented Concepts and Protocols**

**IP Addressing**

Assigning unique IP addresses to devices within the network to ensure proper identification and communication.

**TFTP (Trivial File Transfer Protocol)**

A simple protocol used for transferring files without the need for user authentication, primarily used in transferring router and switch configuration files.

**DHCP (Dynamic Host Configuration Protocol)**

DHCP is a network management protocol used to automatically assign IP addresses and other network configuration parameters to devices on a network, enabling them to communicate effectively without manual intervention.

**VLAN (Virtual Local Area Network)**

VLAN technology allows network administrators to segment a physical network into multiple logical networks. This enhances security and improves traffic management by isolating different groups of devices within the same physical network.

**VTP (VLAN Trunking Protocol)**

VTP is a Cisco proprietary protocol used to manage VLAN configuration across a network of switches. It simplifies the administration of VLANs by propagating VLAN definitions to all switches in a VTP domain, ensuring consistent VLAN configuration.

**OSPF (Open Shortest Path First)**

OSPF is a dynamic link-state routing protocol used within an autonomous system. It uses the Dijkstra algorithm to compute the shortest path, supports hierarchical routing, and quickly adapts to network changes.

**RIP (Routing Information Protocol)**

RIP is a distance-vector routing protocol that uses hop count as the metric to determine the best path to a destination. It is simpler and less resource-intensive than OSPF but is limited by a maximum hop count of 15, making it less suitable for larger networks.

A diagram of a diagram

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