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NETWORK DESIGN AND CONFIGURATION PROJECT

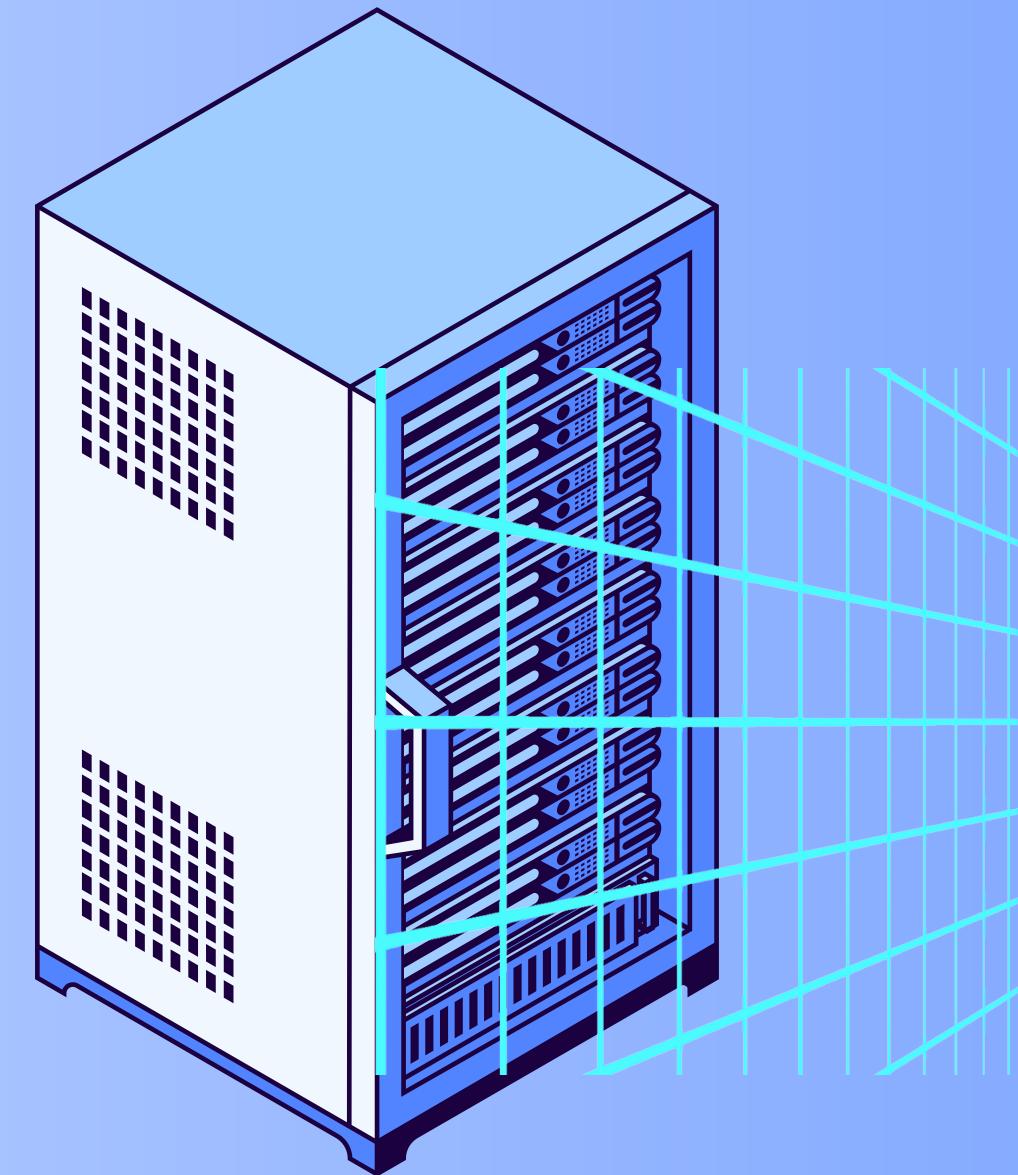




AGENDA FOR NETWORK CONFIGURATION AND SERVICES

PRESENTATION

- Introduction
- VLAN Configuration
- Secure Access with SSH
- EtherChannel Implementation
- Router on a Stick
- DHCP, DNS, HTTP services
- Access Control List (ACL) Configuration
- OSPF Router Setup and Eigrp configuration
- HIGH AVAILABILITY WITH HSRP
- DYNAMIC NAT (NETWORK ADDRESS TRANSLATION) SETUP
- PORT-SECURITY
- NETWORK DIAGRAM REVIEW
- NETWORK TESTING AND VALIDATION AND CHALLENGES AND SOLUTIONS



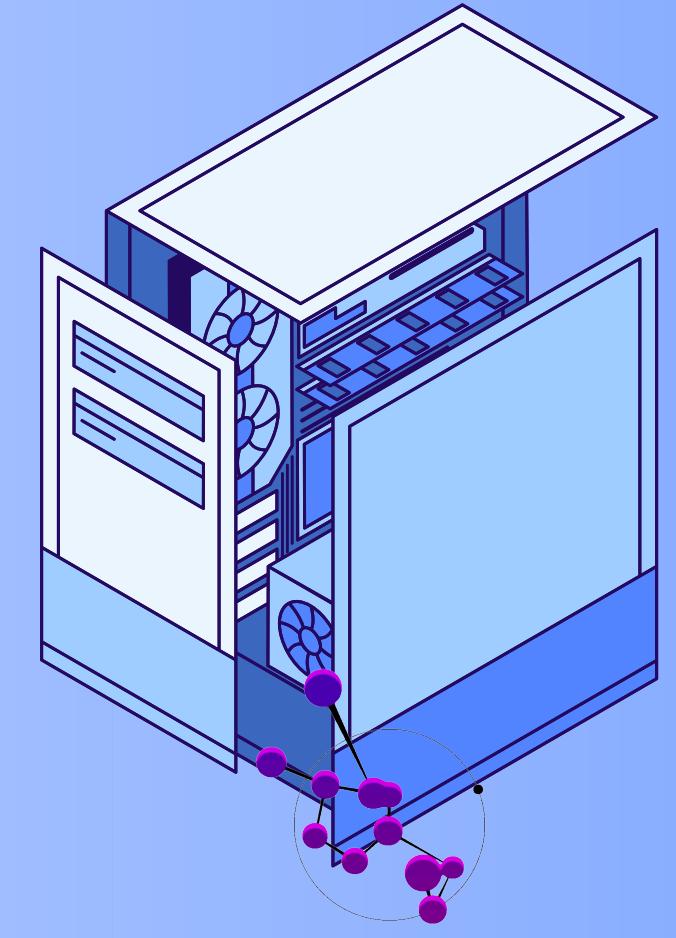
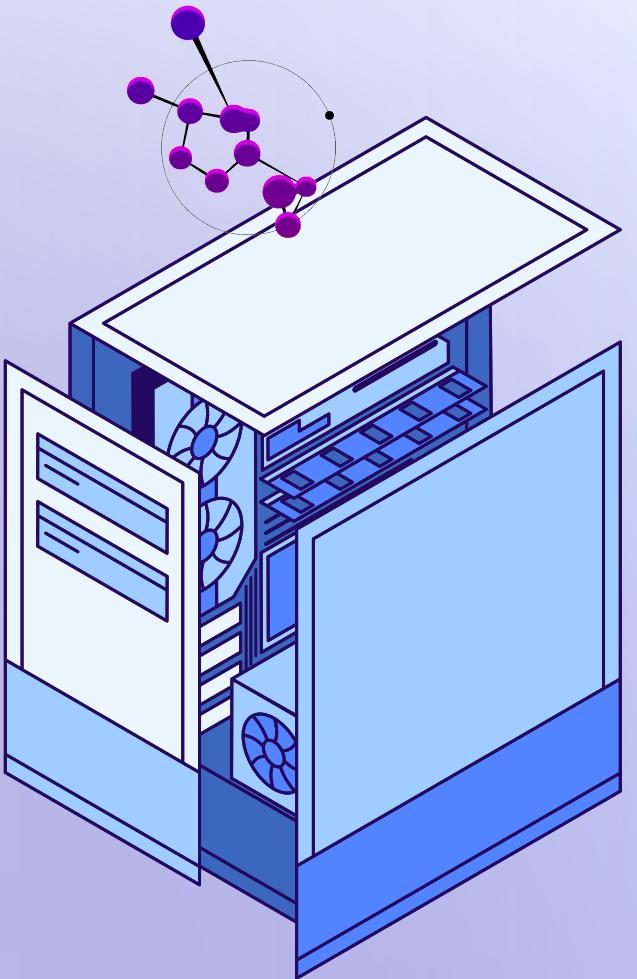


PROJECT OVERVIEW

OBJECTIVE: BUILD A NETWORK INFRASTRUCTURE WITH VLAN SEGMENTATION, INTER-VLAN ROUTING, SERVICES, AND SECURITY.

COMPONENTS:

- VLANs for different departments (Admin, IT, HR, HQ, Support).
- OSPF, Eigrp , SSH, DHCP, DNS, HTTP.
- Router on Stick, HSRP, NAT, ACLs, and EtherChannel, port-security.





VLAN CONFIGURATION

VLAN (VIRTUAL LOCAL AREA NETWORK)

- TECHNOLOGY THAT ALLOWS YOU TO CREATE SEPARATE NETWORKS WITHIN THE SAME PHYSICAL SWITCH INFRASTRUCTURE. IT ENHANCES NETWORK SEGMENTATION, SECURITY, AND MANAGEMENT BY LOGICALLY DIVIDING A SINGLE SWITCH INTO MULTIPLE BROADCAST DOMAINS.

BENEFITS

- VLANs are configured to segment network traffic and segmentation for performance and security.

KEY CONCEPTS OF VLAN

- Broadcast Domain
- Access Port
- Trunk Port
- VLAN Tagging

VOICE VLAN

- Dedicated VLAN for IP phone traffic. This ensures that voice traffic has a higher priority over regular data traffic.





SSH CONFIGURATION AND ETHERCHANNEL



- **SECURE REMOTE ACCESS:** SSH CONFIGURED FOR SWITCH AND ROUTER MANAGEMENT.

COMMANDS USED:

- Enable SSH on devices
- Set username (cisco) and password (123)
- Enable vty lines for remote access

ETHERCHANNEL

- EtherChannel: Combines multiple physical links into one logical connection using LACP (Link Aggregation Control Protocol).
- Purpose: Improves bandwidth and provides redundancy.





ROUTER

ON STICK SETUP

PURPOSE:

- Allow communication between VLANs through a single physical interface on the router.
- Sub-interfaces created on the router for each VLAN.

EXAMPLE:

- Router interface Giga0/0 configured with multiple sub-interfaces.

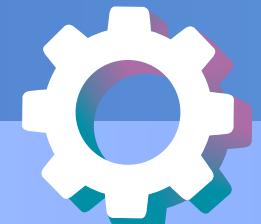




DHCP AND DNS AND HTTP SERVER CONFIGURATION



- DHCP: Central server configured for automatic IP address assignment.
- DNS: Name resolution service set up for easy access to resources.
- VLAN 40: Hosts these services.
- HTTP Server: VLAN 50 hosts an internal web server.
- Purpose: Provides access to internal applications and resources.





ACCESS CONTROL LISTS (ACLs)

ACLs IMPLEMENTED

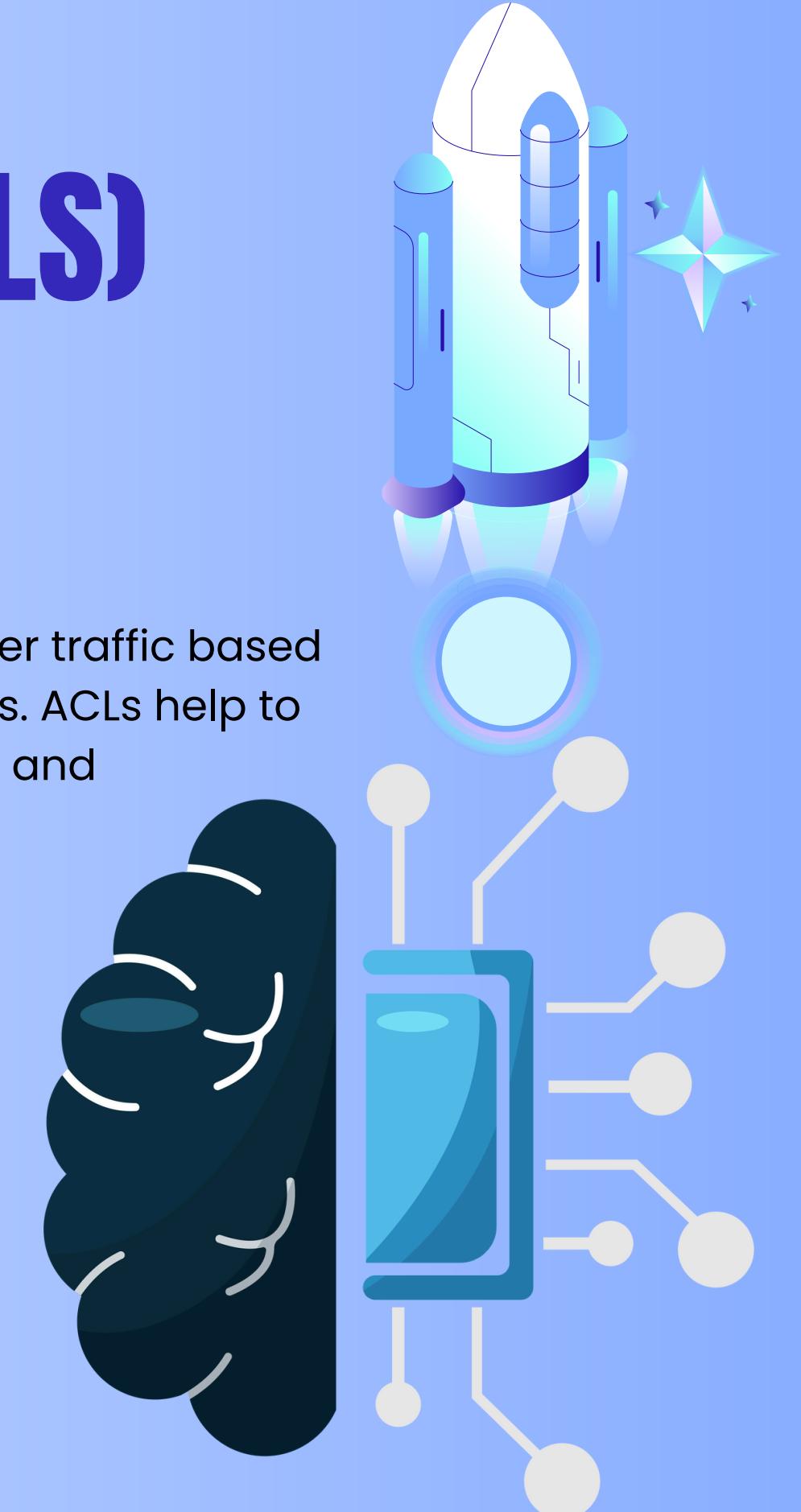
- a set of rules used in network devices like routers and switches to filter traffic based on various criteria such as IP addresses, protocols, and port numbers. ACLs help to control the flow of traffic into or out of a network, enhancing security and managing network performance.

Types of ACLs

- Standard ACLs
- Extended ACLs

Example Rules

- Allow only PCs 6 and 7 to access the internet.
- Restrict server access to specific IPs only.





ROUTING PROTOCOL



OSPF PROTOCOL

- Dynamic Routing Protocol: OSPF used between routers for faster convergence.
- OSPF Areas: Configured for scalability.

EIGRP Protocol

- Cisco proprietary advanced distance-vector routing protocol used for automating routing decisions and configurations.



HSRP

HSRP (HOT STANDBY ROUTER PROTOCOL):

- Cisco proprietary protocol designed to provide high availability and redundancy for IP networks. HSRP allows you to configure a group of routers to work together as a single virtual router, which improves network reliability and reduces downtime in case of hardware or link failure.
- Configured for redundancy and high availability.
- Ensures continuous network access if the primary router fails.

Roles

- Active Router
- Standby Router



DYNAMIC NAT (NETWORK ADDRESS TRANSLATION)



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Dynamic NAT

- Method of mapping multiple private IP addresses to a pool of public IP addresses dynamically
- Dynamic NAT allows many private IP addresses to share a pool of public IP addresses, making it a more efficient use of available public IPs.
- Dynamic NAT provides flexibility in handling connections from private to public networks and makes efficient use of public IP resources.



KEY CONCEPTS OF DYNAMIC NAT

- Inside Local Address
- Inside Global Address
- Outside Local Address
- Outside Global Address
- NAT Pool
- Access Control List (ACL)





Port Security

- Feature on Cisco switches that provides control over what devices can connect to a specific switch port.
- It helps secure the network by limiting the number of MAC addresses that can be learned on a particular port, which prevents unauthorized devices from connecting.

KEY CONCEPTS OF PORT SECURITY

- Static Secure MAC Address
- Dynamic Secure MAC Address
- Sticky Secure MAC Address
- Violation Modes





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THANK YOU!

