

Design and Implementation for Computer Science and Mathematics Departments

Objective:

Design and implement a robust network infrastructure to serve the needs of the Computer Science and Mathematics departments at the university. The network should provide segregated access for each department while enabling communication between them. Security, scalability, and efficient management of IP addresses are paramount.

Ip Addressing Table

Device	Interface	Ip address	Subnet mask
Faculty-Router-1	Int g0/0.3	192.168.3.1	255.255.255.0
Faculty-Router-1	Int g0/1.7	192.168.7.1	255.255.255.0
Faculty-Router-1	Int g0/0.33	192.168.33.1	255.255.255.248
Faculty-Router-1	Int g0/1.77	192.168.77.1	255.255.255.248
CSC-SW1	Vlan 33	192.168.33.2	255.255.255.248
MATH-SW1	Vlan 77	192.168.77.2	255.255.255.248

USE 8.8.8.8 for DNS server where applicable

Vlan table

Device	Vlan	name
CSC-SW1	Vlan 3	Computer science
CSC-SW1	Vlan 33	management
MATH-SW1	Vlan 7	Maths department
MATH-SW1	Vlan 77	management
CSC-SW1/Math-SW1	Vlan 900	sink_hole

1. Network Topology Planning:

- Collaborate with department heads to determine the physical layout and placement of networking devices for both departments.
- Consider scalability and future expansion requirements.

2. IP Address Assignment:

- Allocate IP address ranges and subnetting:
- every first ip address of a subnet is allocated for default gateway

- every last useable ip address is reserved for remote management

- Computer Science Department:

- Subnet: 192.168.3.0/24

- DHCP Pool Name: compSciDHCP

- exclude Range: 192.168.3.1 - 192.168.3.10

- Mathematics Department:

- Subnet: 192.168.7.0/24

- DHCP Pool Name: mathsDHCP

- exclude Range: 192.168.7.1 - 192.168.7.10

3. Router-on-Stick Inter-VLAN Routing:

- Configure Faculty Router (Faculty-Router-1) for inter-VLAN routing to facilitate communication between departments.

4. DHCP Setup:

- Set up DHCP servers for each department with named pools:

- Computer Science Department: compSciDHCP

- Mathematics Department: mathsDHCP

5. VLAN Configuration:

- Implement VLANs:

- VLAN 3 for Computer Science Department

- VLAN 7 for Mathematics Department

6. Switch Configuration:

- Configure CSC-SW1 and MATH-SW1 switches:

- Assign VLANs to switch ports

- Configure trunk ports for interconnection

- Enable DHCP relay for DHCP requests

7. Port Security:

- Disable unused ports on switches and assign them to VLAN 900 to prevent unauthorized access.

8. Password Encryption:

- Encrypt all authentication passwords using Cisco123 for enhanced security.

9. Remote Management:

- Enable secure remote management protocols on networking devices for ease of access and maintenance.
- username:cisco; password: cisco123
- Allow 4 inbound remote connections on every device
- use 4096 bits for RSA keys

10. Banner Message Configuration:

- Implement security banner messages on networking devices to notify unauthorized access.

11. PC Connection:

- Physically connect PCs to designated switch ports within each department.

12. Synchronous Logging:

- Enable synchronous logging on networking devices to ensure accurate event logging for monitoring and troubleshooting.

13. Connectivity Verification:

- Test and verify connectivity within departments and across VLANs to ensure seamless communication.

Completion Criteria:

- Successful implementation of the network design meeting specified requirements.
- Verified connectivity between devices within each department and across VLANs.
- Security measures implemented to protect the network against unauthorized access.

- Proper documentation of configurations and network topology.

Timeline:

- Planning and Design: 1 week
- Implementation: 2 weeks
- Testing and Verification: 1 week

Assigned Personnel:

- Network Engineer: [Name]
- Department Representatives: [Computer Science], [Mathematics]

Sign-off:

- [Name], Project Manager
- [Name], Department Head (Computer Science)
- [Name], Department Head (Mathematics)