Introduction

This project aims to design and imitate the computer network inside Pulchowk Campus using Cisco Packet Tracer. The network is divided into four areas, each containing various departments, hostel blocks, quarters and servers (web servers and DNS servers). OSPF (Open Shortest Path First) is used for dynamic routing to ensure intercommunication between the networks and PC devices. The network includes 9 routers, 23 networks, 2 internal DNS servers, 2 web servers, and one DNS and web server within the ISP network. Security configurations, such as passwords and hostnames, are implemented to all routers, and telnet is enabled as asked in the requirements. The networks at the Teachers Quarters, Girls Hostel, and Boys Hostel are managed via VLAN configurations. The network design ensures that all devices can communicate with each other, and a few networks have multiple paths for reliability.

Network Topology

Area 0 - Backbone

The CIT router acts as the backbone router, connecting all area border routers. It includes:

- 2 internal networks serving the Library and the New Canteen.

Area 1

Area 1 includes the ICTC, DOECE, and DOE internal networks. Key features include:

- Multipath connections for enhanced network reliability.
- A web server handling requests at ***exam.edu.np***.

Area 2

Area 2 encompasses the Civil, Mechanical, Aero, and Applied Science departments. It includes:

- A local DNS server for internal name resolution.

Area 3

Area 3 consists of the Boys Hostel, Girls Hostel, and Teachers Quarters, all configured using VLANs. This area features:

- A web server handling requests at ***pcampus.edu.np***.
- A DNS server for local name resolution.

ISP Network

The ISP network connects to the Pulchowk network through the area border router CIT. Key characteristics include:

- Forwarding all inside network traffic to the ISP router and vice versa.
- A root DNS server and a web server resolving requests at ***gmail.com.***
- IP Addressing and Subnetting.

Server Details

- Internal Servers
    - DNS Servers: Located in Area 2 and Area 3 for caching and internal web resolution.
    - Web Servers: Located in Area 1 and Area 3, handling requests at ***exam.edu.np*** and ***pcampus.edu.np*** respectively.
- ISP Servers
    - DNS Server: Root DNS server located in the ISP network.

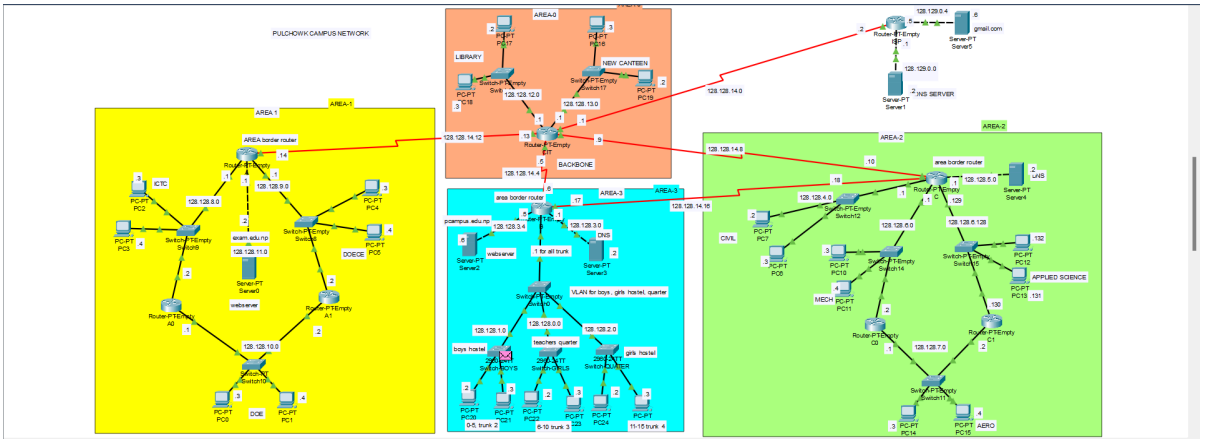
- Web Server: Resolving requests at ***gmail.com***.

Network Security

All routers are configured with the following security:

- Console Password: cisco
- Privileged Access Mode Password: class
- Telnet Password: network
- Routers are named using my first name(eg. rajesh_1) and indexed with 1, 2, 3, etc.
- Each router is configured for telnet access.

NETWORK DESIGN



Conclusion

This design ensures robust communication, security, and efficient routing across different departments and areas within the campus. The network design for Pulchowk Campus may not be fully reflective of the actual Pulchowk network but it demonstrates how large-scale networks can be effectively designed and implemented in the real world. This project fulfils all specified requirements, providing a comprehensive network solution.

Packet Tracer File

The Packet Tracer file containing the complete network design with all configurations is included for reference.

The complete host and network id details are included below.

CHOSEN IP POOL : 128.128.0.0/20

Area 1: 128.128.8.0/22 (ICTC, DOE, DOECE, WEB SERVER)

router_names: A (ARB), A0, A1

WEB SERVER IP: 128.128.11.2: *exam.edu.np*

Subnet	Allocated Hosts	Network ID	Subnet Mask	Broadcast ID	Usable IP Range
A-A0-ICTC	254	128.128.8.0	255.255.255.0	128.128.8.255	128.128.8.1 - 128.128.8.254
A-A1-DOECE	254	128.128.9.0	255.255.255.0	128.128.9.255	128.128.9.1 - 128.128.9.254
A0-A1-DOE	254	128.128.10.0	255.255.255.0	128.128.10.255	128.128.10.1 - 128.128.10.254
A-WEBSERV	2	128.128.11.0	255.255.255.252	128.128.11.3	128.128.11.1 - 128.128.11.2

Area 2: 128.128.4.0/22 (CIVIL, MECH, DNS SERVER, APPLIED SCIENCE, AERO)

router_names: C (ARB), C0, C1

DNS server IP: 128.128.5.2

Subnet	Allocated Hosts	Network ID	Subnet Mask	Broadcast ID	Usable IP Range
C-CIVIL	254	128.128.4.0	255.255.255.0	128.128.4.255	128.128.4.1 - 128.128.4.254
C-DNS	254	128.128.5.0	255.255.255.0	128.128.5.255	128.128.5.1 - 128.128.5.254
C-C0-MECH	126	128.128.6.0	255.255.255.128	128.128.6.127	128.128.6.1 - 128.128.6.126
C-C1-APP.SC	126	128.128.6.128	255.255.255.128	128.128.6.255	128.128.6.129 - 128.128.6.254
C0-C1-AERO	126	128.128.7.0	255.255.255.128	128.128.7.127	128.128.7.1 - 128.128.7.126

Area 3: 128.128.0.0/22 (WEB SERVER, BOYS HOSTEL, DNS SERVER, QUARTER, GIRLS HOSTEL)

router_names: B (ARB)

WEB SERVER IP: 128.128.3.6: *pcampus.edu.np*

DNS SERVER IP:128.128.3.2

Subnet	Allocated Hosts	Network ID	Subnet Mask	Broadcast ID	Usable IP Range
B-QUARTER	254	128.128.0.0	255.255.255.0	128.128.0.255	128.128.0.1 - 128.128.0.254
B-BOYS	254	128.128.1.0	255.255.255.0	128.128.1.255	128.128.1.1 - 128.128.1.254
B-GIRLS	254	128.128.2.0	255.255.255.0	128.128.2.255	128.128.2.1 - 128.128.2.254
B-DNS	2	128.128.3.0	255.255.255.252	128.128.3.3	128.128.3.1 - 128.128.3.2
B-WEBSERV	2	128.128.3.4	255.255.255.252	128.128.3.7	128.128.3.5 - 128.128.3.6

Area 0: 128.128.12.0/23 (LIBRARY, CANTEEN)

router_names: CIT (ASBR)

Subnet	Allocated Hosts	Network ID	Subnet Mask	Broadcast ID	Usable IP Range
CIT-LIB	254	128.128.12.0	255.255.255.0	128.128.12.255	128.128.12.1 - 128.128.12.254
CIT-CAN	254	128.128.13.0	255.255.255.0	128.128.13.255	128.128.13.1 - 128.128.13.254

Inter-Area router networks: 128.128.14.0/23

Subnet	Allocated Hosts	Network ID	Subnet Mask	Broadcast ID	Usable IP Range
CIT-ISP	2	128.128.14.0	255.255.255.252	128.128.14.3	128.128.14.1 - 128.128.14.2
CIT-B	2	128.128.14.4	255.255.255.252	128.128.14.7	128.128.14.5 - 128.128.14.6
CIT-C	2	128.128.14.8	255.255.255.252	128.128.14.11	128.128.14.9 - 128.128.14.10
CIT-A	2	128.128.14.12	255.255.255.252	128.128.14.15	128.128.14.13 - 128.128.14.14
B-C	2	128.128.14.16	255.255.255.252	128.128.14.19	128.128.14.17-128.128.14.18

ISP router networks:

- **ISP-(DNS SERVER) NETWORK: 128.129.0.0/30**
- **DNS SERVER IP- 128.129.0.2**
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- **ISP-(WEB SERVER) NETWORK: 128.128.0.4/30**
- **WEB SERVER IP-128.129.0.6 : *gmail.com***