# United Interna+onal University

Project Report
Department of CSE
CSE 3712: Computer Network Lab

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## Enterprise Network Design Report

**Project Title:** Dhaka Link Network
**Course:** Computer Network Lab – Term Project
**Tool Used:** Cisco Packet Tracer

# 1. Project Overview

The *Dhaka Link Network* project presents a fully functional enterprise-grade network designed using **Cisco Packet Tracer**. The network incorporates **30+ end devices**, partitioned into **public and private domains**, and is built with robust design principles including **dynamic routing (RIP)**, **subnetting (VLSM)**, **DHCP configuration**, and **Dynamic NAT**. All core features were successfully tested, ensuring full internal and external connectivity.

# 2. Network Architecture

## 2.1 Network Topology

- **Devices Used**:
  - **Routers**: 6 **Switches/Hubs**: 6
  - **End Devices**: 30 (PCs, Laptops, Servers)
- Routers are interconnected in a **realistic mesh topology** to simulate enterprise-level design.
- Devices are clearly **named and organized** for ease of identification and troubleshooting.

## 2.2 Network Segmenta5on

The enterprise network was logically divided into **two segments**:

### *Private Network (Le/ Side)*

- `192.168.1.0/24` – *BackupZone-LAN*
- `192.168.2.0/24` – *DevZone-LAN*
- `192.168.200.0/24` – *CoreOps-LAN*

### *Public Network (Right Side)*

- `21.10.10.0/24` – *DesignLab-LAN*
- `200.165.10.0/24` – *SupportBase-LAN*
- `22.10.10.0/24` – *AnalyticsHub-LAN*

IP ranges were carefully designed using maximize IP efficiency and scalability.

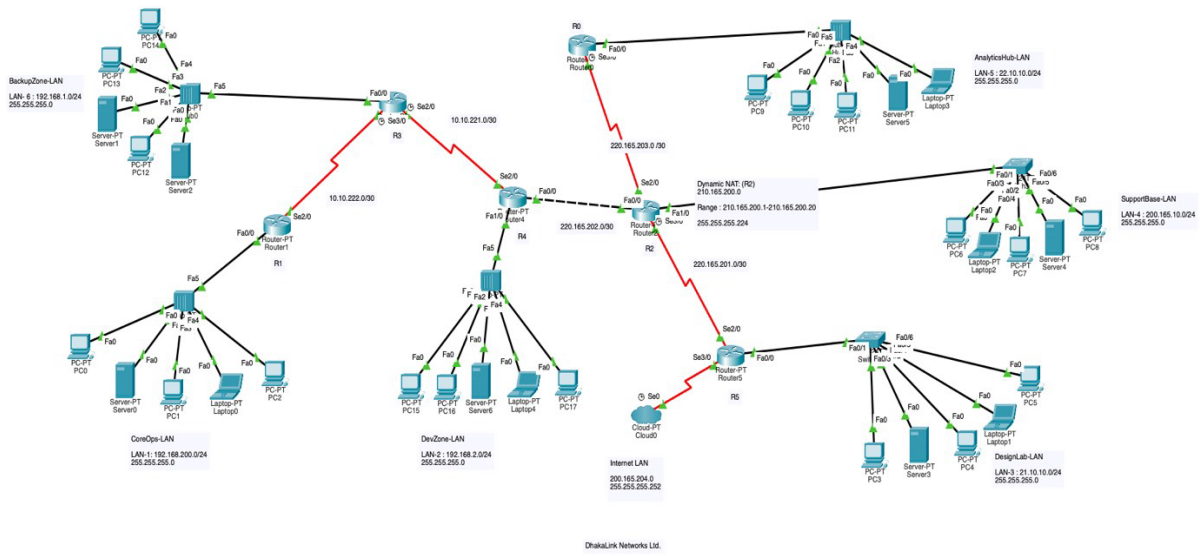
# 3. Network Configura;on

## 3.1 DHCP Configura5on

Each LAN segment is configured with DHCP services for automatic IP assignment:

| Router | LAN | Subnet | Excluded Addresses |
|---|---|---|---|
| R1 | CoreOps-LAN | 192.168.200.0/24 | 192.168.200.1 - 192.168.200.10 |
| R3 | BackupZone-LAN | 192.168.1.0/24 | 192.168.1.1 - 192.168.1.10 |
| R4 | DevZone-LAN | 192.168.2.0/24 | 192.168.2.1 - 192.168.2.10 |
| R5 | DesignLab-LAN | 21.10.10.0/24 | 21.10.10.1 - 21.10.10.10 |
| R2 | SupportBase-LAN | 200.165.10.0/24 | 200.165.10.1 - 200.165.10.10 |
| R0 | AnalyHcsHub-LAN | 22.10.10.0/24 | 22.10.10.1 - 22.10.10.10 |

Each pool specifies a **default router (gateway)** and **DNS server (8.8.8.8)**.




## 3.2 Rou5ng Configura5on (RIP v2)

Dynamic routing was configured using **Routing Information Protocol (RIP)**. Each router advertises directly connected networks.

### *Router RIP Configura>ons:*

- **R1**:
- `router rip`
- `network 192.168.200.0`
- `network 10.10.222.0`
- **R4**:

- router rip
- network 192.168.2.0
- network 220.165.202.0
- network 10.10.221.0
- **R5**:
- router rip
- network 21.10.10.0
- network 220.165.201.0
- network 200.165.204.0
- **R2**:
- router rip
- version 2
- network 200.165.10.0
- network 220.165.202.0 • network 220.165.203.0
- network 210.165.201.0
- **R3**:
- router rip
- network 10.10.221.0 • network 10.10.222.0
- network 192.168.1.0
- **R0**:
- router rip
- network 220.165.203.0
- network 22.10.10.0

All routers successfully **learned dynamic routes**, confirmed via routing tables and `ping` tests.

## 3.3 Dynamic NAT Configura5on (Router R2)

Dynamic NAT was applied on **Router R2** to allow private networks to access external/public resources.

*Configura>on Summary:*

```
ip nat pool NATPOOL 210.165.200.1 210.165.200.20 netmask 255.255.255.224
access-list 1 permit 192.168.200.0 0.0.0.255 access-list 1 permit
192.168.2.0 0.0.0.255 access-list 1 permit 192.168.1.0 0.0.0.255 ip nat
inside source list 1 pool NATPOOL overload
```

*NAT Interface Roles:*

```
interface fa0/0
ip nat inside
exit interface
se2/0  ip nat
inside exit
interface
fa1/0  ip nat
inside exit
interface
```

```
se3/0  ip nat
outside exit
```

**Translation verification** was performed using `show ip nat translations`.

## 4. Tes;ng and Valida;on

- All devices successfully **received IPs** via DHCP.
- **Inter-device communication** verified using `ping` across both public and private segments.
- **Routing tables** reflected all learned routes via RIP.
- **NAT translation** from private to public IP was successful.
- Subnet labels and device names were clearly shown in the topology for readability.
- The entire layout was **cleanly structured** to reflect logical segmentation and minimize visual clutter.

## 5. Challenges Encountered

- Manual **VLSM subnetting** across diverse LANs required precise planning.
- NAT configuration required **accurate identification of inside/outside interfaces**.
- Ensuring DHCP across all routers with proper exclusions demanded repetitive testing.
- Maintaining **clean visual alignment** for 30+ nodes, routers, and switches in Cisco Packet Tracer.

## 6. Conclusion

The *Dhaka Link Network* project effectively demonstrates a practical implementation of enterprise networking fundamentals. Through DHCP, RIP, VLSM, and NAT, the design mirrors real-world scenarios and showcases the value of **structured planning**, **logical segmentation**, and **correct configuration**. This experience solidified understanding of how large-scale networks operate and interconnect efficiently.

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