Title: EIGRP Configuration Lab Report

## 1. Objectives

* To configure **EIGRP (Enhanced Interior Gateway Routing Protocol)** on a multi-router network.
* To enable communication between multiple LANs through EIGRP.
* To understand and verify EIGRP neighbor relationships, routing tables, and end-to-end connectivity.
* To practice troubleshooting connectivity issues using Packet Tracer.

## 2. Theory

* **EIGRP** is an advanced distance-vector routing protocol developed by Cisco.
* It uses **DUAL (Diffusing Update Algorithm)** to calculate the best path and prevent loops.
* EIGRP supports **classless routing**, fast convergence, and partial updates.
* Key metrics include **bandwidth, delay, reliability, load**. By default, EIGRP uses bandwidth and delay to calculate composite metric.
* Advantages of EIGRP:
  + Fast convergence
  + Scalable and efficient
  + Supports multiple network protocols (IP, IPX, Appletalk)

## 3. Network Topology

**Routers:** R1, R2, R3, R4

**PCs:** PC1 (R1 LAN), PC2 (R4 LAN)

PC1 --- R1 --- R2 --- R3 --- R4 --- PC2

**Router Interfaces and IPs:**

| Device | Interface | IP Address | Subnet Mask | Notes |
| --- | --- | --- | --- | --- |
| R1 | Gi0/0/0 | 192.168.1.1 | 255.255.255.0 | PC1 LAN |
| R1 | Gi0/0/1 | 10.0.12.1 | 255.255.255.0 | Link to R2 |
| R2 | Gi0/0/0 | 10.0.12.2 | 255.255.255.0 | Link to R1 |
| R2 | Gi0/0/1 | 10.0.23.1 | 255.255.255.0 | Link to R3 |
| R3 | Gi0/0/0 | 10.0.23.2 | 255.255.255.0 | Link to R2 |
| R3 | Gi0/0/1 | 10.0.34.1 | 255.255.255.0 | Link to R4 |
| R4 | Gi0/0/0 | 10.0.34.2 | 255.255.255.0 | Link to R3 |
| R4 | Gi0/0/1 | 192.168.4.1 | 255.255.255.0 | PC2 LAN |

**PC IPs:**

| PC | IP Address | Subnet Mask | Default Gateway |
| --- | --- | --- | --- |
| PC1 | 192.168.1.2 | 255.255.255.0 | 192.168.1.1 |
| PC2 | 192.168.4.2 | 255.255.255.0 | 192.168.4.1 |

## 4. Implementation Steps

### Step 1: Configure Router Interfaces

R1(config)# interface gi0/0/0  
R1(config-if)# ip address 192.168.1.1 255.255.255.0  
R1(config-if)# no shutdown  
  
R1(config)# interface gi0/0/1  
R1(config-if)# ip address 10.0.12.1 255.255.255.0  
R1(config-if)# no shutdown

Repeat similar steps on R2, R3, and R4 with appropriate IP addresses.

### Step 2: Enable EIGRP on Routers

R1(config)# router eigrp 100  
R1(config-router)# network 192.168.1.0  
R1(config-router)# network 10.0.12.0  
R1(config-router)# no auto-summary

Repeat for R2, R3, R4 with their connected networks.

### Step 3: Configure PCs

Go to **Desktop → IP Configuration** and assign static IP, mask, and default gateway as per table above.

### Step 4: Verify Connectivity

**Check router interfaces:**

show ip interface brief

**Check EIGRP neighbors:**

show ip eigrp neighbors

**Check routing table:**

show ip route

**Test ping between PCs:**

ping 192.168.4.2 # From PC1 to PC2  
ping 192.168.1.2 # From PC2 to PC1

### Step 5: Troubleshooting

* If ping fails:
  + Ensure interfaces are up/up.
  + Verify PC IP and gateway.
  + Check EIGRP neighbors.
  + Confirm routing tables contain all necessary networks.

## 5. Observations

* EIGRP successfully propagated routes between routers.
* PCs can communicate across different LANs.
* Metrics vary based on hop count and interface bandwidth/delay.

## 6. Conclusion

* EIGRP configuration allows dynamic routing and network scalability.
* Lab demonstrates end-to-end connectivity across multiple routers and LANs.
* Understanding of routing tables, neighbor relationships, and metrics is reinforced.

## 7. Diagram

PC1---[R1]---10.0.12.0---[R2]---10.0.23.0---[R3]---10.0.34.0---[R4]---PC2