

## **EIGRP (ENHANCED INTERNAL GATEWAY ROUTING PROTOCOL) DESCRIPTION**

This lab demonstrates the configuration and operation of **Enhanced Interior Gateway Routing Protocol (EIGRP)** in a multi-router network. EIGRP is a **dynamic, Cisco-proprietary routing protocol** designed to provide fast convergence, efficient routing decisions, and reduced network overhead compared to older protocols such as RIP.

The objective of this lab is to enable **automatic route discovery and end-to-end connectivity** between two separate LANs using EIGRP.

### **Network Topology Overview**

The network consists of:

- **Three Cisco ISR4331 routers** (Router1, Router2, and Router3)
- **Two end devices (PC1 and PC2)**
- **Two LANs**, each connected to an edge router
- **Point-to-point WAN links** connecting the routers

The routers are connected in a **linear topology**, allowing EIGRP to dynamically exchange routing information across the network.

### **IP Addressing Scheme**

#### **LAN Networks**

<b>Network</b>	<b>Device</b>	<b>IP Address</b>
192.168.1.0/24	PC1 Router1 (Gateway)	192.168.1.10 192.168.1.1
192.168.3.0/24	PC2 Router2(Gateway)	192.168.3.10 192.168.3.1

#### **Inter-Router Links**

Point-to-point links use **/30 subnets** for efficient IP address usage.

Link	Network	Router IPs
Router1 ↔ Router2	10.0.0.0/30	10.0.0.1 / 10.0.0.2
Router2 ↔ Router3	10.0.0.4/30	10.0.0.5 / 10.0.0.6

### EIGRP Configuration

EIGRP is enabled on all routers using the **same Autonomous System (AS) number**, allowing them to form neighbor relationships and exchange routing information automatically.

Key characteristics of EIGRP in this lab:

- Uses **DUAL (Diffusing Update Algorithm)** for loop-free routing
- Supports **fast convergence**
- Uses a **composite metric** based on bandwidth and delay
- Sends **partial and triggered updates** instead of periodic broadcasts

Each router advertises:

- Its directly connected LAN network
- Its connected point-to-point WAN links

### Routing Operation and Traffic Flow

When PC1 sends traffic to PC2:

1. PC1 forwards the packet to its default gateway (Router1)
2. Router1 consults its EIGRP routing table
3. The packet is forwarded to Router2
4. Router2 forwards the packet to Router3
5. Router3 delivers the packet to PC2 on the destination LAN

Return traffic follows the same path in reverse.

If a link failure occurs, EIGRP quickly recalculates an alternate path (if available), ensuring minimal disruption.

## Protocols Used

- **EIGRP** – dynamic routing protocol
- **IPv4** – logical addressing
- **ICMP** – connectivity testing
- **Ethernet** – LAN communication

## Key Commands Used

### Interface Configuration

- ip address
- no shutdown

### EIGRP Configuration

- router eigrp <AS-number>
- network <network-address>
- no auto-summary

### Verification Commands

- show ip route
- show ip eigrp neighbors
- show ip eigrp topology
- ping
- traceroute

### Verification and Testing

Connectivity is verified by:

- Pinging PC2 from PC1
- Checking that EIGRP routes appear in the routing table (D routes)
- Confirming neighbor relationships between routers

Successful tests confirm correct EIGRP operation.