

## RIP(routing information protocol) DESCRIPTION

This lab demonstrates the use of **RIP (Routing Information Protocol)** to enable **dynamic routing** across a multi-router network. Unlike static routing, RIP allows routers to **automatically learn and update routes** by exchanging routing information with neighboring routers.

The topology is designed in a **ring/mesh-like structure** to show how RIP handles multiple paths and ensures full connectivity between all networks.

### **Network Topology Overview**

The network consists of:

- **Four routers (Router1, Router2, Router3, and Router4)**
- **Four LANs**, each connected to a different router
- **Four switches**, one per LAN
- **Eight end devices (PCs)**, two in each LAN

Each LAN represents a separate subnet, and all routers are interconnected using **point-to-point serial links** with /30 addressing.

### **LAN Addressing and End Devices**

Each router connects to a local LAN using a switch. Every LAN contains **two PCs (PC1 and PC2 equivalents)**.

#### **LAN 1 – Connected to Router1**

- Network: 192.168.1.0/24
- Devices:
  - PC: 192.168.1.2
  - PC2: 192.168.1.3
- Default Gateway: 192.168.1.1

#### **LAN 2 – Connected to Router2**

- Network: 192.168.2.0/24
- Devices:
  - PC3: 192.168.2.2

- PC4: 192.168.2.3
- Default Gateway: 192.168.2.1

### **LAN 3 – Connected to Router3**

- Network: 192.168.3.0/24
- Devices:
  - PC5: 192.168.3.2
  - PC6: 192.168.3.3
- Default Gateway: 192.168.3.1

### **LAN 4 – Connected to Router4**

- Network: 192.168.4.0/24
- Devices:
  - PC7: 192.168.4.2
  - PC8: 192.168.4.3
- Default Gateway: 192.168.4.1

### **Router Interconnections**

The routers are connected using **serial point-to-point links**, each configured with a /30 subnet to efficiently use IP addresses.

Examples of inter-router networks include:

- 10.0.0.0/30
- 10.0.0.4/30
- 10.0.0.8/30
- 10.0.0.12/30

Each serial link provides exactly two usable IP addresses, one for each router interface.

### **RIP Routing Configuration**

**RIP version 2 (RIPv2)** is enabled on all routers to allow automatic route exchange.

Key characteristics of RIP in this lab:

- Uses **hop count** as its routing metric
- Maximum hop count of **15**
- Periodic updates every **30 seconds**
- Supports **classless routing** (RIPv2)

Each router advertises:

- Its directly connected LAN network
- Its serial link networks

Once RIP is enabled, routers automatically learn all remote networks without manual static routes.

### **Traffic Flow Explanation**

When a PC in one LAN sends traffic to a PC in another LAN:

1. The PC forwards the packet to its default gateway
2. The router checks its RIP-learned routing table
3. The packet is forwarded to the next router with the lowest hop count
4. RIP dynamically selects the best available path
5. The destination router delivers the packet to the target LAN

If one path fails, RIP automatically **reconverges** and selects an alternative route if available.

### **Protocols Used**

- **IPv4** – logical addressing
- **RIPv2** – dynamic routing protocol
- **ICMP** – connectivity testing using ping

### **Key Commands Used**

#### **Interface Configuration**

- ip address
- no shutdown
- clock rate (on DCE serial interfaces)

### **RIP Configuration**

- router rip
- version 2
- no auto-summary
- network – advertise connected networks

### **Verification**

- show ip route
- show ip protocols
- ping
- tracert / traceroute