

STATIC ROUTING DESCRIPTION

This lab demonstrates the use of static routing to enable communication between two separate local area networks (LANs) connected through multiple routers. The objective of the lab is to show how routers forward traffic across several hops when routing paths are manually configured, without relying on dynamic routing protocols.

Network Topology Overview

The network consists of two LANs connected through four Cisco ISR4331 routers (R1, R2, R3, and R4) arranged in a linear topology.

- LAN 1 is connected to Router R1
- LAN 2 is connected to Router R4
- Routers R1 to R4 are interconnected using point-to-point /30 networks

Each LAN contains two PCs labeled PC1 and PC2.

LAN Addressing

LAN 1 (Left-side Network)

- Network: 192.168.1.0/24
- Devices:
 - PC1: 192.168.1.10
 - PC2: 192.168.1.11
- Default Gateway: IP address of R1's LAN interface

LAN 2 (Right-side Network)

- Network: 192.168.4.0/24
- Devices:
 - PC1: 192.168.4.10
 - PC2: 192.168.4.11
- Default Gateway: IP address of R4's LAN interface

Router Interconnections

Routers are connected using /30 subnets, which are ideal for point-to-point links because they provide only two usable IP addresses.

- R1 ↔ R2: 10.0.12.0/30
- R2 ↔ R3: 10.0.23.0/30
- R3 ↔ R4: 10.0.34.0/30

Each router interface is assigned an IP address within its respective subnet.

Static Routing Configuration

Since no dynamic routing protocol is enabled, static routes are manually configured on each router to define paths to remote networks.

- R1 is configured with a static route to reach 192.168.4.0/24 via R2
- R2 and R3 contain static routes that forward traffic toward the correct next hop in both directions
- R4 is configured with a static route to reach 192.168.1.0/24 via R3

This ensures that traffic can travel end-to-end across all routers and return correctly.

Traffic Flow Explanation

When PC1 or PC2 in LAN 1 sends traffic to PC1 or PC2 in LAN 2:

1. The PC forwards the packet to its default gateway (R1)
2. R1 forwards the packet to R2 using its static route
3. R2 forwards the packet to R3
4. R3 forwards the packet to R4
5. R4 delivers the packet to the destination PC

Reply traffic follows the same path in reverse.

Protocols Used

- IPv4 – logical addressing and packet forwarding
- Static Routing – manually configured routes
- ICMP – connectivity testing using ping

No dynamic routing protocols (RIP, OSPF, EIGRP) are used in this lab.

Key Commands Used

- ip address – assign IP addresses to router interfaces
- no shutdown – enable router interfaces
- ip route – configure static routes
- show ip route – verify routing table entries
- show ip interface brief – check interface status
- ping – test connectivity between PCs