LAB 5: CONFIGURATION OF STATIC ROUTES AND DEFAULT ROUTES

OBJECTIVES

The main objectives of this lab are:

- To understand the concept of routing in computer networks.
- To configure static routes between different networks.
- To configure a default route on a router.
- To verify connectivity between different networks using routing tables and testing tools.

SOFTWARE AND HARDWARE REQUIREMENTS

- Cisco Packet Tracer
- Windows PC/Laptop

THEORY

- **Routing**

Routing is the process of selecting a path for data packets to travel from a source network to a destination network. Routers use routing tables to decide the best path to forward packets.

- **Static Routing**

Static routing is a type of routing in which routes are manually configured by the network administrator. These routes do not change automatically unless modified by the administrator.

Advantages of Static Routing:

- Simple to configure in small networks
- Low overhead (no routing protocol traffic)
- More secure

Disadvantages of Static Routing:

- Not scalable for large networks
- Requires manual updates if the network topology changes

Static Routing – Working Mechanism (with Command)

- Route is manually configured using:
- ip route 192.168.2.0 255.255.255.0 10.0.0.2(ip route <destination network> <subnet mask> <next-hop IP>)
- Route is stored permanently in the routing table.
- Router checks the destination IP of incoming packets.
- It finds the best matching static route.
- Packet is forwarded to the next-hop router/interface.
- No automatic updates if the network changes.
- Best for small, stable networks and provides fast forwarding.

DEFAULT ROUTE

A default route is a route used when no specific route to the destination network exists in the routing table. It is also known as the gateway of last resort.

Default route is commonly represented as:

0.0.0.0/0

This means any destination network.

Default Routing – Working Mechanism

- Default route is manually configured using:
- ip route 0.0.0.0 0.0.0.0 10.0.0.1
- It is stored as the gateway of last resort in the routing table.
- When a packet arrives, the router checks for specific routes first.

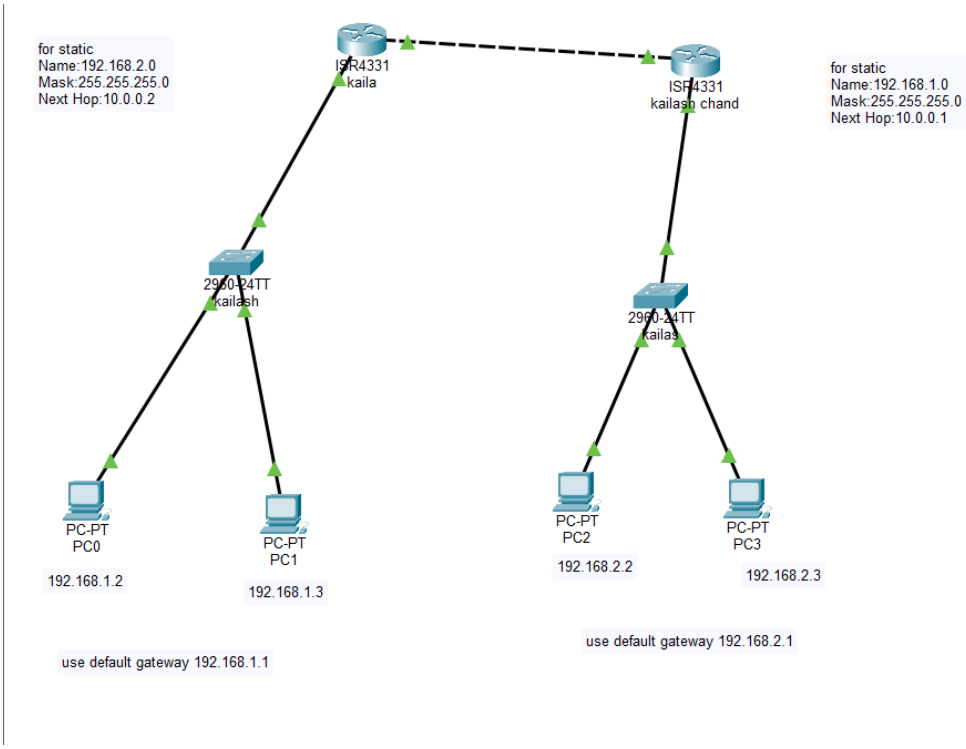
- If no match is found, the default route is selected.
- Packet is forwarded to the default gateway (next-hop router).
- Used to forward traffic to unknown networks / internet.
- Reduces routing table size and simplifies routing.

PROCEDURE

1. Create network topology and connect PCs and routers.
2. Assign IP addresses to PCs and router interfaces.
3. Enable router interfaces using no shutdown.
4. Configure static route:
5. ip route <destination network> <subnet mask> <next-hop IP>
6. Configure default route:
7. ip route 0.0.0.0 0.0.0.0 <next-hop IP>
8. Verify routing using:
9. show ip route
10. Test connectivity using ping.

OBSERVATION:

NETWORK TOPOLOGY



This network topology consists of two LANs connected by two routers. Each LAN has a switch that connects multiple PCs. The left LAN uses the network 192.168.1.0/24 with router IP 192.168.1.1 as the default gateway, while the right LAN uses 192.168.2.0/24 with router IP 192.168.2.1 as the default gateway. The two routers are connected through a WAN link (10.0.0.0 network). Static routes are configured on both routers so that devices in one LAN can communicate with devices in the other LAN.

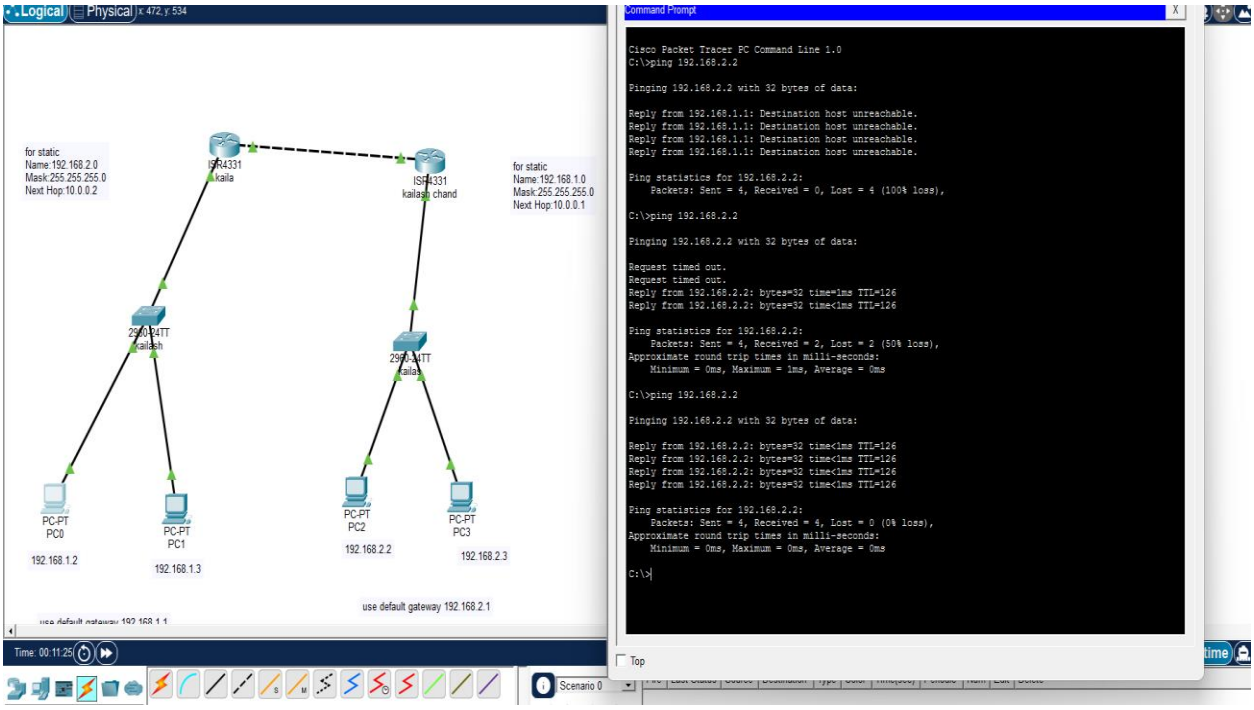
CONFIGURATION TABLE

Device	Interface	IPV4 address	Subnet mask	Default gateway
Router Kaila	GigabitEthernet0/0	10.0.0.1	255.0.0.0	N/A
Router Kailash chand	GigabitEthernet0/1	192.168.1.1	255.255.255.0 N	N/A
Router 0	GigabitEthernet0/0	10.0.0.2	255.0.0.0	N/A
Router 1	GigabitEthernet0/1	192.168.2.1	255.255.255.0	N/A
PC0	FastEthernet0	192.168.1.2	255.255.255.0	192.168.1.1
PC1	FastEthernet0	192.168.1.3	255.255.255.0	192.168.1.1
PC2	FastEthernet0	192.168.2.2	255.255.255.0	192.168.2.1
PC3	FastEthernet0	192.168.2.3	255.255.255.0	192.168.2.1

ROUTING CONFIGURATION

Device	Routing type	Route
Router Kaila	Static	ip route 192.168.2.0 255.255.255.0 10.0.0.2
Router	Static	ip route 192.168.1.0 255.255.255.0 10.0.0.1
Router Kailash chand	Default	ip route 0.0.0.0 0.0.0.0 10.0.0.2

Ping:



RESULT

The static routes and default routes were successfully configured. Communication between different networks was achieved, and data packets were routed correctly between LAN 1 and LAN

CONCLUSION

In this lab, we learned how to configure static routes and default routes on routers. Static routing is suitable for small and stable networks, while default routing helps reduce routing table size. This experiment improved understanding of routing tables and packet forwarding in IP networks.

PRECAUTION

- Ensure correct IP addressing and subnet masks.
- Always enable router interfaces using no shutdown.
- Verify physical connections.
- Use correct next-hop IP addresses.