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Title: **Configure RIP Routing Protocol: (Use: Packet Tracer/GNS)**

Aim: Set up a network - configure interfaces, IP addresses and routing protocols
(RIP,OSPF,EIGRP,BGP).

Objectives:
To understand and implement routing protocols RIP in Cisco Packet Tracer

Writeup:

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CN Lab Assignment 7

Theory:

(i) Routing Algorithms -

a) Distance Vector Routing - The distance vector routing algorithm works by having each router maintain a table, giving the best-known distance from source to destination and which route is used to get there. These tables are updated by exchanging the information with the neighbour having a direct link.

Ex.
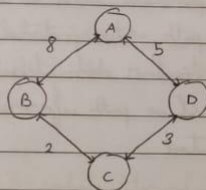
Routing table of A:

Destination	Distant	Hop
A	0	A
B	8	B
C	∞	-
D	5	D

b) Link State Routing - It is a routing technique in which each router shares the knowledge of its neighbourhood with every other router in the internetwork. The three key factors of LSR are:

1) Knowledge about the neighbourhood: Instead of sending its routing table, a router sends information about its neighbourhood only

2) Flooding: Each router sends the information to every other router on the internetwork except its neighbors. This is known as flooding.

3) Information sharing: A router sends the information to every other router only when a change occurs in the information.

It has two states -
- Initial state - Each node knows the cost of the neighbors
- Final state - Each node knows the entire graph

c) Path Vector Routing - Path vector protocols, such as BGP, are used across domains aka autonomous systems. In a path vector protocol, a router does not just recieve the distance vector for a particular destination from its neighbor, instead a node recieves the distance as well as path information, that the node can use to calculate how traffic is routed.

(ii) RIP Implementation:
- Introduction: Routing Information Protocol is a dynamic routing protocol that uses hop count as a routing metric to find the best path between the source and destination the network.

- Algorithm: RIP uses distance-vector algorithm, which is used to calculate the distance and direction of the vector of the next hop from the information obtained by the neighboring router. It is also known as the Bellman-Ford algorithm.

$$d_x(y) = \min_v \{c(x,v) + d_v(y)\}$$

- Features:
  1. Updates of the network are exchanged periodically
  2. Updates are always broadcasted
  3. Full routing tables are sent is updates
  4. Router always trust routing information received

- RIPv1 and RIPv2:

RIPv1 i) It uses classful routing. The periodic routing updates do not carry subnet information, lacking support for variable length subnet masks (VLSM). This ensures that all subnet masks in the network have the same length

RIPv2 2) It is a classless, distance vector routing protocol. Being a classless routing protocol, it includes the subnet mask with the network address in its routing updates

- RIP Timers: The update interval is the interval at which routes that are learned by RIP are advertised to neighbors. This timer controls the interval between routing updates. The update interval is set to 30 seconds, with a small random amount of time added when the timer is reset.

FAQ's

1) State the classification of routing protocols
→ ~~Distance vector and link state protocols~~

1. RIP: It is an interior gateway protocol, used with LANs and WANs. It has two versions, one classless and one with classes, named RIPv2 and RIPv1 respectively

2. Interior Gateway protocol: It uses many of RIP's function but increases the maximum hops to 100, which makes it work better for longer networks

3. Enhanced interior gateway routing protocol: An be enhanced version of IGRP, which increases the maximum hops to 255.

4. Open shortest path first: Uses the SPF algorithm to ensure efficient transmission of data. Uses Dijkstra's algorithm to recalculate pathways.

5. Exterior Gateway Protocol: It maintains closely located network databases to route the different pathways data might take to reach its destination.

6. Border Gateway Protocol: It uses the best path selection algorithm for performing data package transfers, making it a distance vector protocol as well.

7. Immediate system-to-immediate system: It is a link state, interior gateway and classless protocol - is commonly used to send and share IP routing information on the internet. It uses an altered version of Dijkstra's algorithm.

2) Explain some key features of RIP

→ RIP uses a modified hop count as a way to determine network distance. By default, if a router's neighbor owns a destination network and can deliver packets directly to the destination network without using any other routers, that route has one hop.

3) Draw and Explain RIP message format

→

	0	7	15	31	
Header	Command	Version	Must be zero		
↑	AF I		RIP	Must be zero	
Route	IP Address				
Entries	Must be zero				
	Must be zero				
↓	Metric				

Command: Type of message, Version: Version of RIP, AF I: Address Family Identifier
Metric: Cost of the route
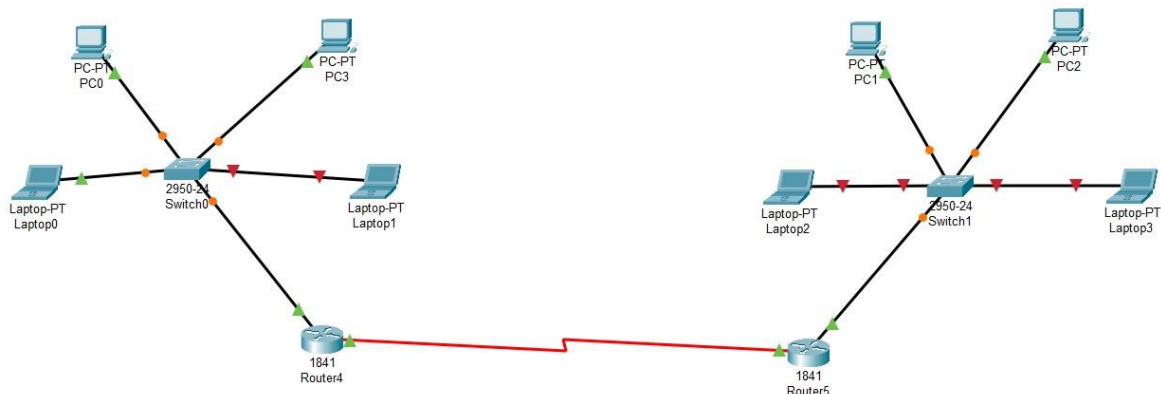
Equivalent IOS Commands

```
Router(config)#interface FastEthernet0/0
Router(config-if)#ip address 192.168.1.4 255.255.255.0
Router(config-if)#ip address 192.168.1.4 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
```