DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PSG COLLEGE OF TECHNOLOGY

(AUTONOMOUS INSTITUTION)

COIMBATORE – 641004

ASSIGNMENT PRESENTATION (19L505-COMPUTER NETWORKS)

ACADEMIC YEAR: 2022-2023

SEMESTER- 5

TITLE: ROUTING INFORMATION PROTOCOL(RIP)

(VERSION 1 AND VERSION 2)

DONE BY:

R SURESHKUMAR (20L147)

S A S VISHNUPRIYA (20L153)

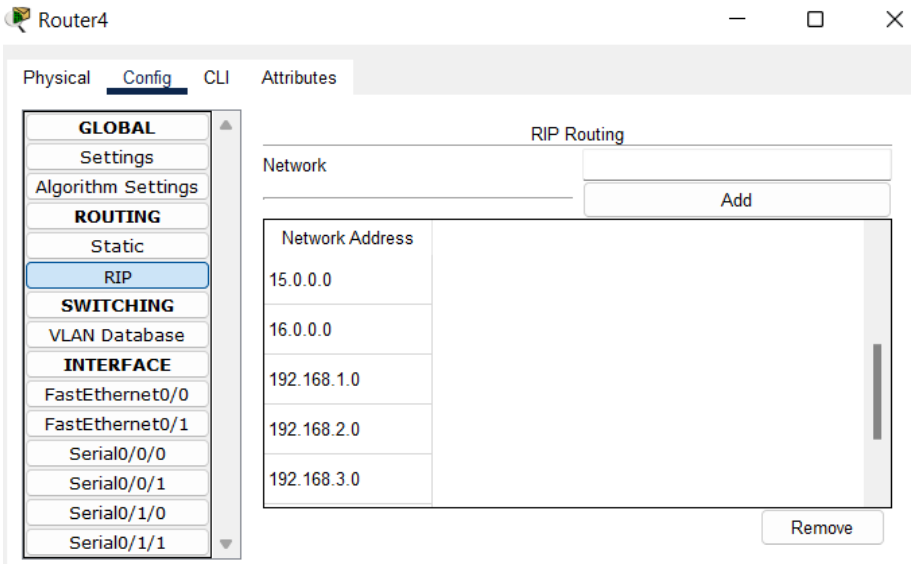
R AKASH (21L401)

INTRODUCTION:

RIP stands for Routing Information Protocol. RIP is an intra-domain routing protocol used within an autonomous system. Here, intra-domain means routing the packets in a defined domain, for example, web browsing within an institutional area. RIP is based on the distance vector-based strategy, so we consider the entire structure as a graph where nodes are the routers, and the links are the networks. We have used **CISCO PACKET TRACER** to simulate the scenario of RIP working. Let's have a discussion on both versions of RIP and get into the implementation of RIP.

RIP WORKING:

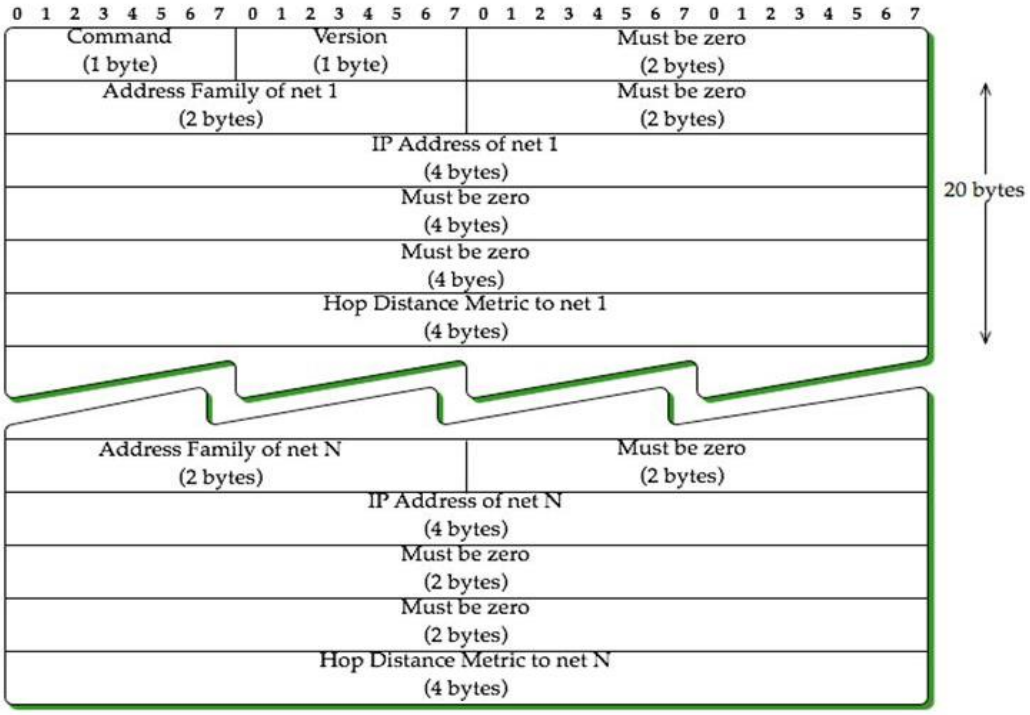
In a general RIP routing table, the first column is the destination, or we can say that it is a network address. The next column contains the address of the router to which the packet is to be sent to reach the destination. The cost metric is the number of hops to reach the destination. The number of hops available in a network would be the cost. The hop count is the number of networks required to reach the destination. In RIP, infinity is defined as 16, which means that the RIP is useful for smaller networks or small autonomous systems. The maximum number of hops that RIP can contain is 15 hops, i.e., it should not have more than 15 hops as 16 is infinity.



In CISCO PACKET TRACER, we have only one column (i.e) Network Address and other things such as Router Address and Hop counts are calculated internally by the simulator.

RIP VERSION 1:

RIPv1 is an open standard protocol means it works on the various vendor's routers. It works on most of the routers, it is classful routing protocol. Updates are broadcasted. Its administrative distance value is 120, it means it is not reliable, The lesser the administrative distance value the reliability is much more. Its metric is hop count and max hop count is 15. There will be a total of 16 routers in the network. When there will be the same number of hop to reach the destination, RIP starts to perform load balancing. Load balancing means if there are n ways to reach the destination and each way has same number of routers then packets will be sent to each path to reach the destination. This reduces traffic and also the load is balanced. It is used in small companies, in this protocol routing tables are updated in each 30 sec. Whenever link breaks RIP trace out another path to reach the destination. It is one of the slowest protocol.



(RIPv1 Packet Format)

ADVANTAGES OF RIPv1:

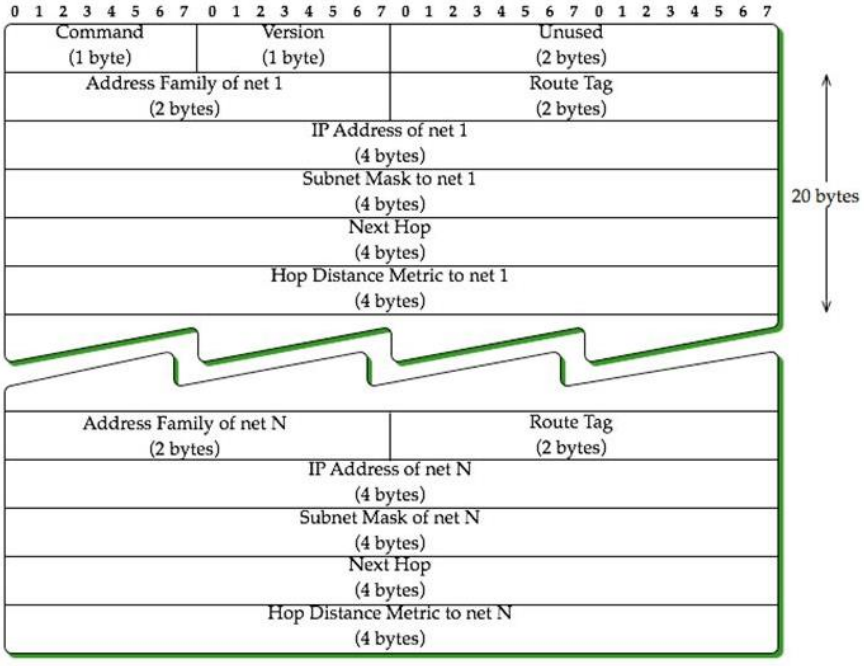
- Easy to configure.
- Less overhead
- No complexity.

DISADVANTAGES OF RIPv1:

- ❖ Bandwidth utilization is very high as broadcast for every 30 seconds.
- ❖ It works only on hop count.
- ❖ It is not scalable as hop count is only 15. If there will be requirement of more routers in the network it would be a problem.
- ❖ Convergence is very slow, wastes a lot of time in finding alternate path.

RIP VERSION 2:

Due to some deficiencies in the original RIP specification, RIP version 2 was developed in 1993. It supports Classless Inter-Domain Routing (CIDR) and has the ability to carry subnet information, its metric is also hop count, and maximum hop count 15 is same as RIP version 1. It does subnetting and multicasting. Auto summary can be done on every router. In RIPv2 Subnet masks are included in the routing update. RIPv2 multicasts the entire routing table to all adjacent routers at the address 224.0.0.9, as opposed to RIPv1 which uses broadcast (255.255.255.255). RIPv2 provides authentication support so that RIP links can require authentication keys (passwords) before they become active. By default, this authentication is disabled.



(RIPv2 Packet Format)

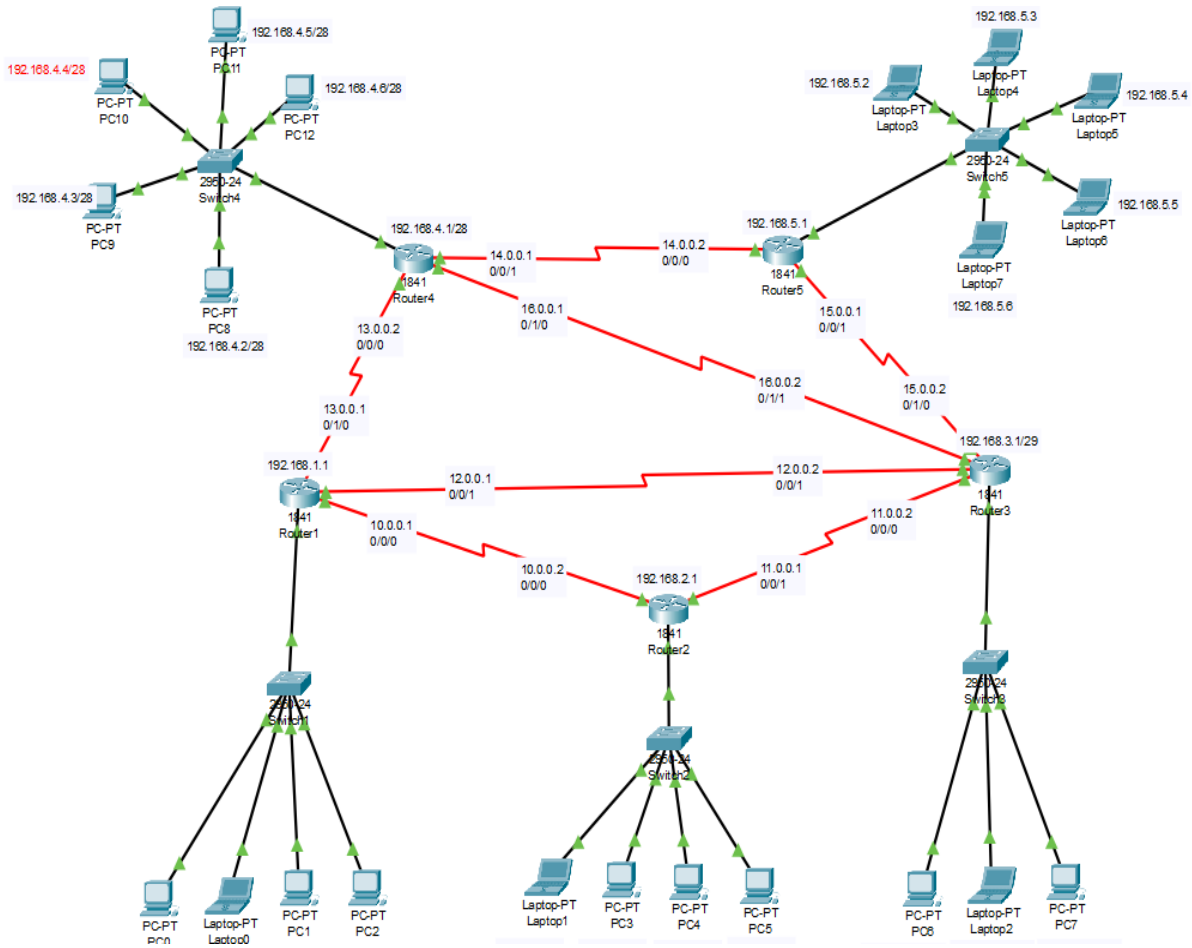
ADVANTAGES OF RIPv2:

- ❖ RIPv2 is a standardized protocol.
- ❖ It's VLSM (Variable Length Subnet Mask) compliant.
- ❖ Provides fast convergence.
- ❖ It sends triggered updates when the network changes.
- ❖ Works with snapshot routing – making it ideal for dial networks.

DISADVANTAGES OF RIPv2:

- ❖ Maximum Hop count of 15, due to the 'count-to-infinity' vulnerability.
- ❖ No concept of neighbours.
- ❖ Exchanges entire table with all neighbours every 30 seconds (except in the case of a triggered update).

IMPLEMENTATION:



We have set up 5 individual Local Area Networks in an Autonomous system. Out of which 3 networks (LAN#1, LAN#2, LAN#5) are using IPv4 classful addresses and other 2 networks (LAN#3, LAN#4) are using IPv4 classless addresses. Connections are made as shown in figure. Network addresses are given as,

LAN#1 – 192.168.1.0

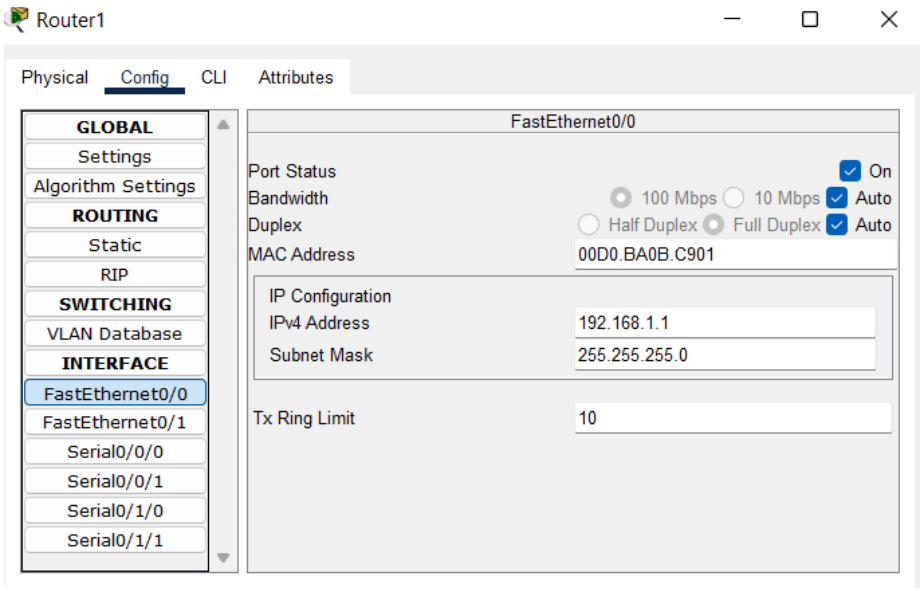
LAN#2 – 192.168.2.0

LAN#3 – 192.168.3.0/29

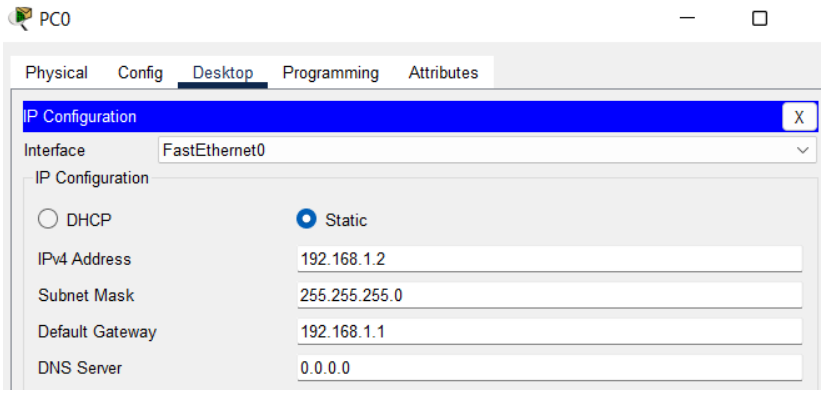
LAN#4 – 192.168.4.0/28

LAN#5 – 192.168.5.0

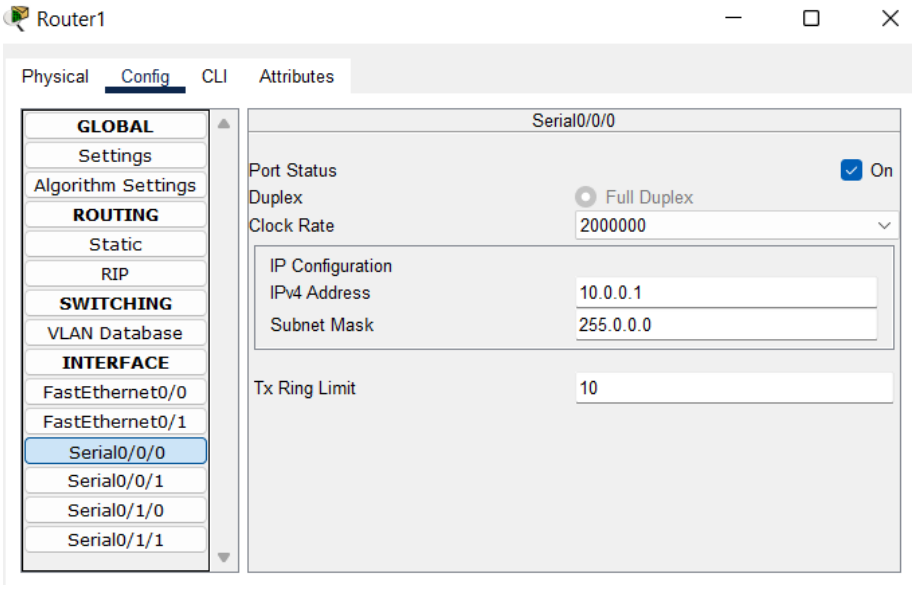
Accordingly, the router's address and PC's addresses are given to the respective ethernet ports of that devices. The port status should made ON. Subnet Mask should be given.



While setting up PC configuration, Default gateway should be set as Router's address of that particular network.



Serial wires are used to make connection among routers. Each serial port of router is configured with the IP address. Here also port status should be made ON. Respective core networks are formed due to these connections.



The version of RIP can be set by giving the below line into the CLI of the respective router.

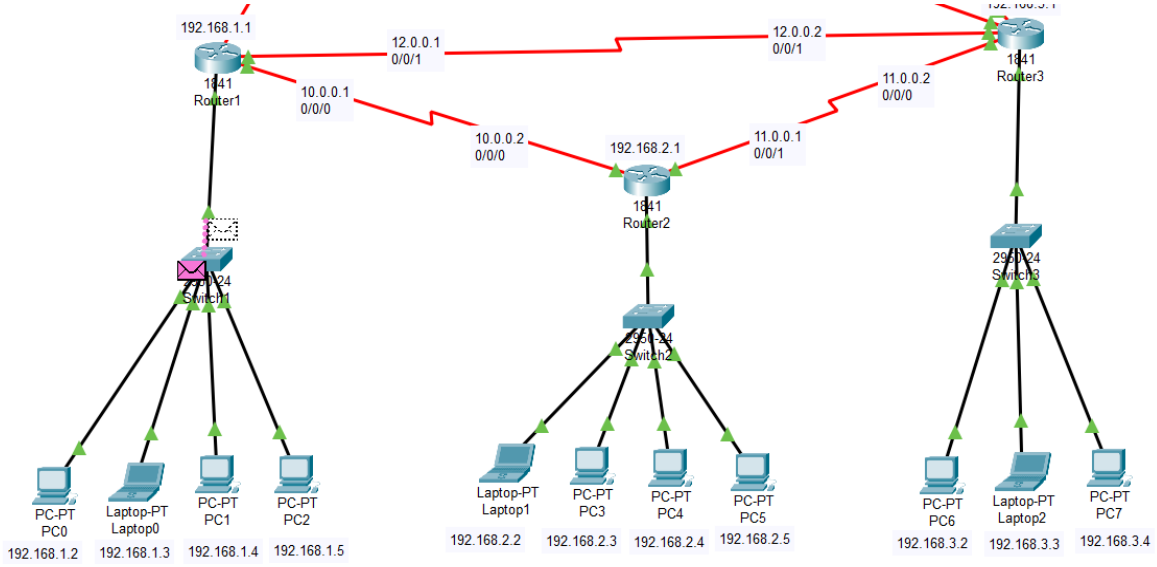
```
Router #configure terminal
Router(config) #router rip
Router(config-router) #version 1
```

Similarly, version 2 also configured.

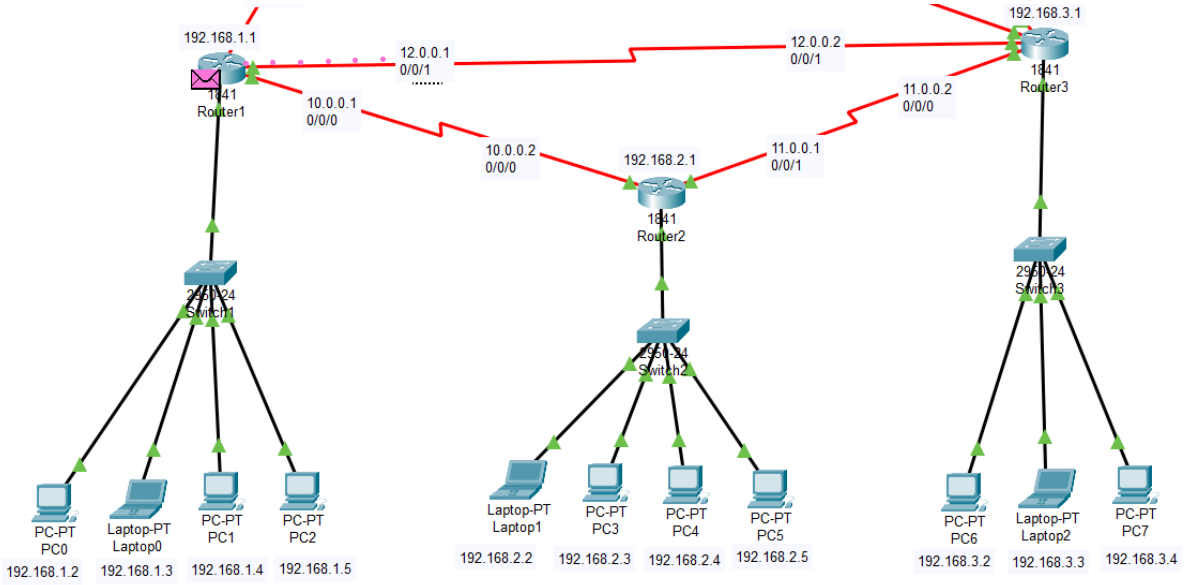
Next, All the network addresses should be added to the RIP option under Config tab in each router. This will form the RIP routing table and hop counts are calculated by the simulator automatically. According to this RIP routing table, routes are determined by respective routers.

The connection and configuration setup is done.

Let us send simple Protocol Data Unit (PDU) from PC1 in LAN#1 to Laptop2 in LAN#3 to check whether our RIP routing table is determining the correct route. Packet is sent to Router1 via Switch1 as shown below.



Since the destination device is not within the same network, Router1 checks for the RIP routing table to find the destination router and to determine the best route to reach that destination router.



In this case, Router1 finds that the destination is Router3 and we have 4 ways to reach it.

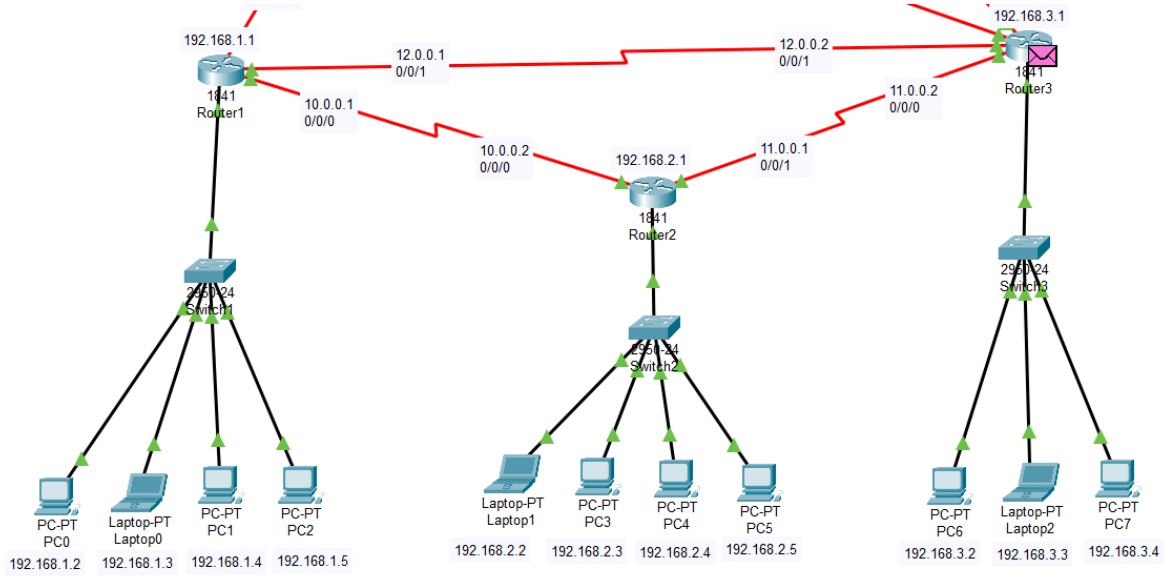
Route1: 12.0.0.0 (1 hop)

Route2: 10.0.0.0 – 11.0.0.0 (2 hops)

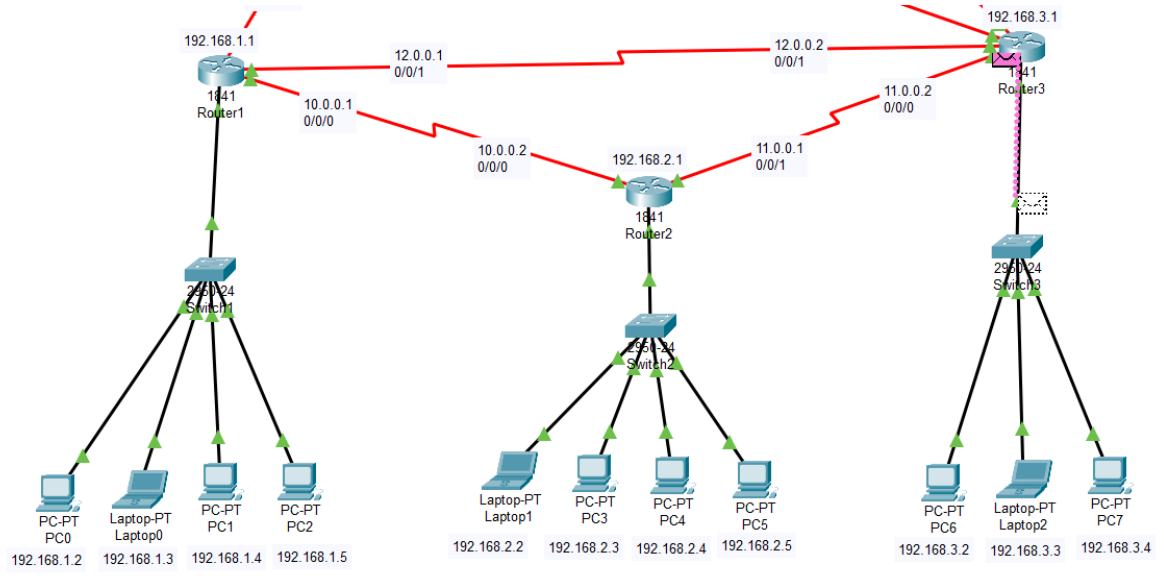
Route3: 13.0.0.0 – 16.0.0.0 (2 hops)

Route4: 13.0.0.0 – 14.0.0.0 – 15.0.0.0 (3 hops)

Router1 takes the Route1 since it takes lesser number of hops to reach the destination router.



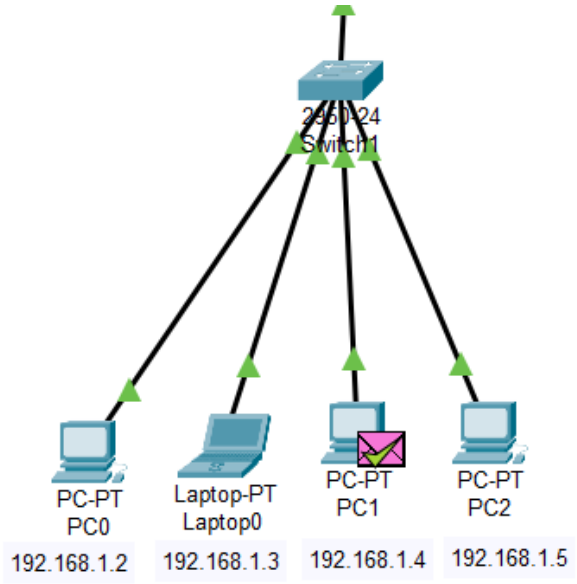
After reaching the destination router, packet is then forwarded to the destination device in that network.

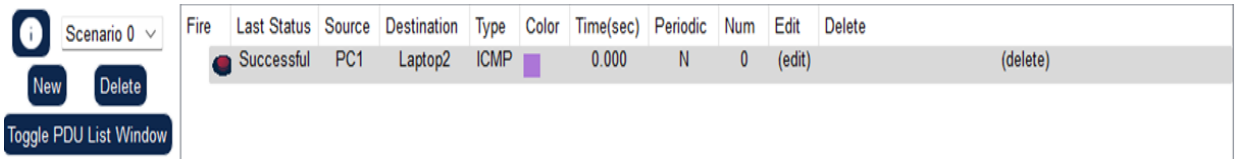


Once the packet is received by the device, it sends back the acknowledgement to the source device via the same route or via the route decided by the destination router.

RESULT:

After receiving the acknowledgement, success message is displayed in the scenario window.





CONCLUSION:

Thus, the simulation for the RIP is implemented and the output result is verified. As discussed, mostly the RIP is used in smaller networks due to its limitations.

REFERENCES:

https://www.javatpoint.com/rip-protocol

https://www.geeksforgeeks.org/routing-interface-protocol-rip-v1-v2/

https://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst2960xr/software/152_5_e/configuration_guide/b_1525e_consolidated_2960xr_cg/routing_information_protocol.pdf