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Configuration of Residential Network using Enhanced Interior Gateway Routing Protocol

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ABSTRACT

A residential area is used in housing predominates, as opposed to industrial and commercial areas. These include single-family housing, multi-family residential, or mobile homes. Enhanced Interior Gateway Routing Protocol (EIGRP) is a network protocol that is routers exchange information more efficiently than other protocols. EIGRP is an advanced distance-vector routing protocol used on a computer network for automating routing decisions and configuration. EIGRP is used to share routes on a router with other routers within the same autonomous system. Unlike other routing protocols, such as RIP, EIGRP only sends incremental updates, reducing the workload on the router and the amount of data that needs to be transmitted. EIGRP evolved from Interior Gateway Routing Protocol (IGRP) and routers using EIGRP and IGRP can interoperate for selecting a route with one protocol. Using EIGRP, a router keeps a copy of it's neighbor's routing tables. If it can't find a route to a destination in one of these tables, it queries its neighbors for a route and query their neighbors until a route is found. When a routing table entry changes in one of the routers, it notifies its neighbors of the change only.

KEYWORDS: *EIGRP, IGRP*

INTRODUCTION

A computer network is a group of computer systems and connected together for the purpose of sharing resources. The types of networks have many kinds. A router is a network device and layer three of the OSI reference model. Routing is sent IP packets from one network to another network.

Cisco Packet Tracer is software allows users to simulate the complete network by adding and connecting different network devices. The configuration of Cisco routers used a command-line interface.

ROUTING ALGORITHM

A routing algorithm is a set of step-by-step operations used to direct Internet traffic efficiently. When a packet of data leaves its source, there are many different paths it can take to its destination. The routing algorithm is used to determine mathematically the best path to take.

Different routing algorithms use different methods to determine the best path. A distance-vector algorithm calculates a graph of all available routes determines the cost of traveling to each immediate neighbor. This information is collected for every node to create a distance table used to determine the best path from any one node to another.

ROUTING TABLE

For a network router to know where to send packets of data it receives, it uses a routing table. The routing table contains a list of specific routing destinations, and when the router receives a packet of data, it references the routing table to know where to send that data. The routing table may also contain information on how far each destination is from the router. In essence, a routing table is a map for the router.

A routing table does not contain a list of all possible destinations. Rather, it contains a list of destinations. Each router contains this list and when it received packets of data it directs that packet to the next link or hops in the network until it reaches its final destination. The routing table contains a list of IP addresses, Gateway addresses, and other information.

Table 1: Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.1.1	255.255.255.0	N/A
	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A
	S0/0/1	10.3.3.1	255.255.255.252	N/A
R2	G0/0	192.168.2.1	255.255.255.0	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A
R3	G0/0	192.168.3.1	255.255.255.0	N/A
	S0/0/0	10.3.3.2	255.255.255.252	N/A
	S0/0/1 (DCE)	10.2.2.1	255.255.255.252	N/A

PC-1	NIC	192.168.1.2	255.255.255.0	192.168.1.1
PC-2	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-3	NIC	192.168.1.4	255.255.255.0	192.168.1.1
PC-4	NIC	192.168.2.2	255.255.255.0	192.168.2.1
PC-5	NIC	192.168.2.3	255.255.255.0	192.168.2.1
PC-6	NIC	192.168.2.4	255.255.255.0	192.168.2.1
PC-7	NIC	192.168.3.2	255.255.255.0	192.168.3.1
PC-8	NIC	192.168.3.3	255.255.255.0	192.168.3.1
PC-9	NIC	192.168.3.4	255.255.255.0	192.168.3.1

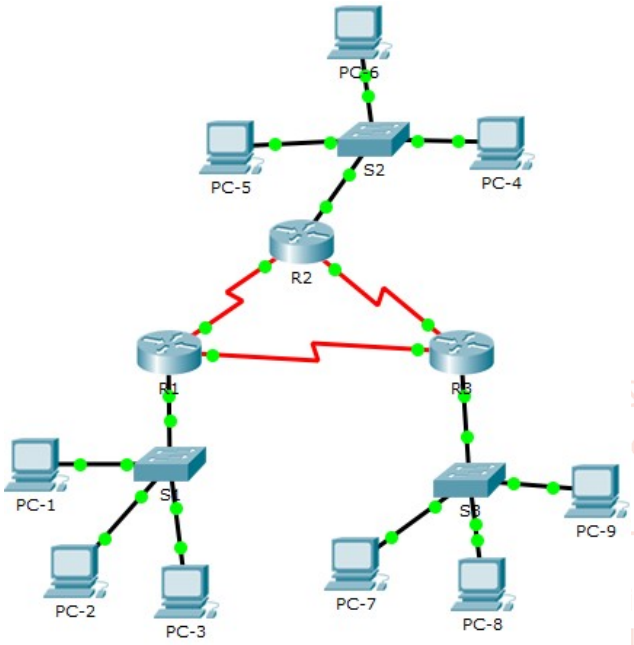

Figure1 Residential network created using cisco packet tracer

Objectives

Part 1 : Build the Network and Configure Basic Device Settings
Part 2 : Configure EIGRP Routing
Part 3 : Verify ERGIP Routing

Part 1 : Build the Network and Configure Basic Device Settings

Step 1: Cable the network.
Step 2: Initialize and reload the routers.
Step 3: Configure basic settings for **each router**.

A. Disable DNS lookup.
B. Configure device name as shown in the topology.
C. Assign **class** as the privileged EXEC password.
D. Assign **cisco** as the console and **cisco** as vty passwords.
E. Configure a message of the day (MOTD) banner to warn users that unauthorized access is prohibited.
F. Configure **logging synchronous** for the console line.
G. Configure the IP address listed in the Addressing Table for all interfaces.
H. Set the clock rate for all DCE serial interfaces at **128000**.
I. Copy the running configuration to the startup configuration.

Router R1 Configuration:

A. Router(config)# no ip domain lookup
B. Router(config)#hostname R1
C. R1(config)#enable password execpass
D. R1(config)#line console 0
R1(config-line)#password conpass
R1(config-line)#login
R1(config)#exit
R1(config)#line vty 0 4
R1(config-line)#password vtypass
R1(config-line)#login
R1(config)#exit
E. R1(config)#banner motd #" unauthorized access is prohibited"#
F. R1(config)#line console 0
R1(config-line)#logging synchronous
R1(config-line)#exit
G. R1(config)#interface g0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shut
R1(config)#exit
R1(config)#interface s0/0/0
R1(config-if)#ip address 10.1.1.1 255.255.255.252
H. R1(config-if)#clock rate 128000
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#interface s0/0/1
R1(config-if)#ip address 10.3.3.1 255.255.255.252
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#exit
I. R1# copy running-config startup-config

Router R2 Configuration:

A. Router(config)# no ip domain lookup
B. Router(config)#hostname R2
C. R2(config)#enable password execpass
D. R2(config)#line console 0
R2(config-line)#password conpass
R2(config-line)#login
R2(config)#exit
R2(config)#line vty 0 4
R2(config-line)#password vtypass
R2(config-line)#login
R2(config)#exit
E. R2(config)#banner motd #" unauthorized access is prohibited"#
F. R2(config)#line console 0
R2(config-line)#logging synchronous
R2(config-line)#exit
G. R2(config)#interface g0/0
R2(config-if)#ip address 192.168.2.1 255.255.255.0
R2(config-if)#no shut
R2(config)#exit
R2(config)#interface s0/0/0
R2(config-if)#ip address 10.1.1.2 255.255.255.252
H. R2(config-if)#clock rate 128000
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#interface s0/0/1

R2(config-if)#ip address 10.2.2.2 255.255.255.252
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#exit

I. R2# copy running-config startup-config

Router R3 Configuration:

A. Router(config)# no ip domain lookup
B. Router(config)#hostname R3
C. R3(config)#enable password execpass
D. R3(config)#line console 0
R3(config-line)#password conpass
R3(config-line)#login
R3(config)#exit
R3(config)#line vty 0 4
R3(config-line)#password vtypass
R3(config-line)#login
R3(config)#exit
E. R3(config)#banner motd #" unauthorized access is prohibited"#
F. R3(config)#line console 0
R3(config-line)#logging synchronous
R3(config-line)#exit
G. R3(config)#interface g0/0
R3(config-if)#ip address 192.168.3.1 255.255.255.0
R3(config-if)#no shut
R3(config)#exit
R3(config)#interface s0/0/0
R3(config-if)#ip address 10.3.3.2 255.255.255.252
H. R3(config-if)#clock rate 128000
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#interface s0/0/1
R3(config-if)#ip address 10.2.2.1 255.255.255.252
R3(config-if)#no shut
R3(config-if)#exit
R3(config)#exit

I. R3# copy running-config startup-config

Step 4 : Configure PC hosts.
Step 5 : Test connectivity.

Part 2: Configure EIGRP Routing

Step 1 : Configure EIGRP **on R1**
R1(config)#router eigrp 10
R1(config-router)#network 192.168.1.0 0.0.0.255
R1(config-router)#network 10.1.1.0 0.0.0.3
R1(config-router)#network 10.3.3.0 0.0.0.3
R1(config-router)#exit

Step 2 :Configure EIGRP **on R2**
R2(config)#router eigrp 10
R2(config-router)#network 192.168.2.0 0.0.0.255
R2(config-router)#network 10.1.1.0 0.0.0.3
R2(config-router)#network 10.2.2.0 0.0.0.3
R2(config-router)#exit

Step 3 :Configure EIGRP **on R3**
R3(config)#router eigrp 10
R3(config-router)#network 192.168.3.0 0.0.0.255
R3(config-router)#network 10.3.3.0 0 0.0.0.3
R3(config-router)#network 10.2.2.0.0 0.0.0.3
R3(config-router)#exit

Part 3 : Verify ERGIP Routing

Step 1 : Verify EIGRP neighbors and routing information.
Step 2 : Verify EIGRP protocol setting.
Step 3 : Verify end-to-end connectivity.

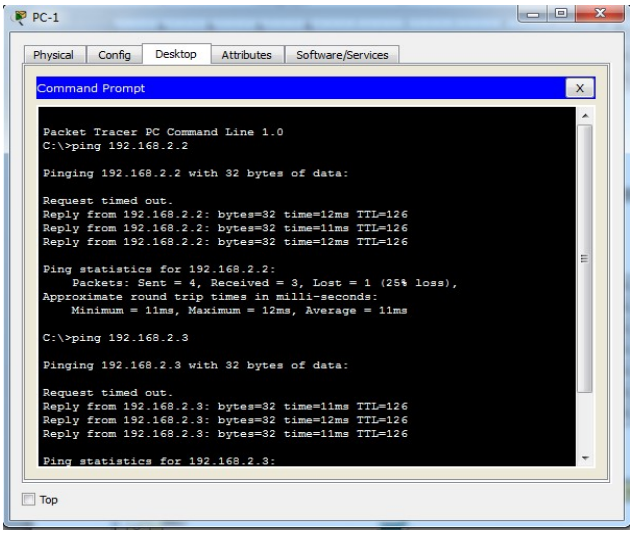

Figure 2 Ping test from PC-1 to PC-4 and PC-5

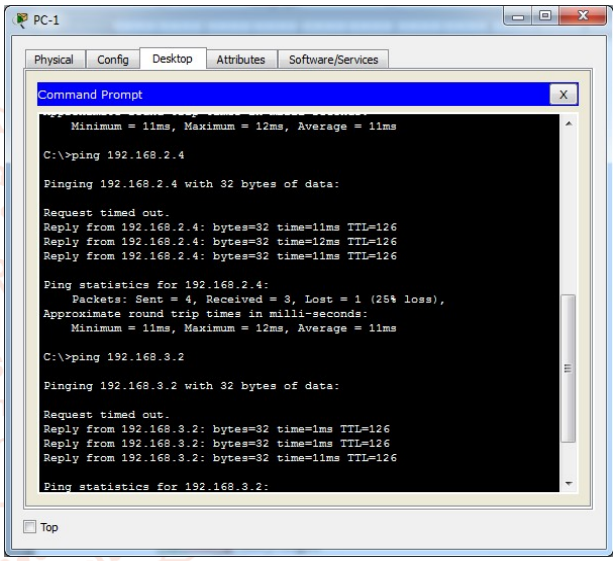

Figure 3 Ping test from PC-1 to PC-6 and PC-7

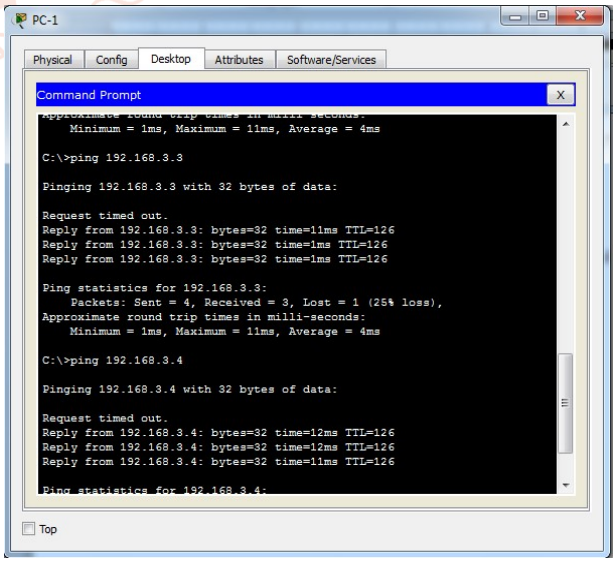

Figure 4 Ping test from PC-1 to PC-8 and PC-9

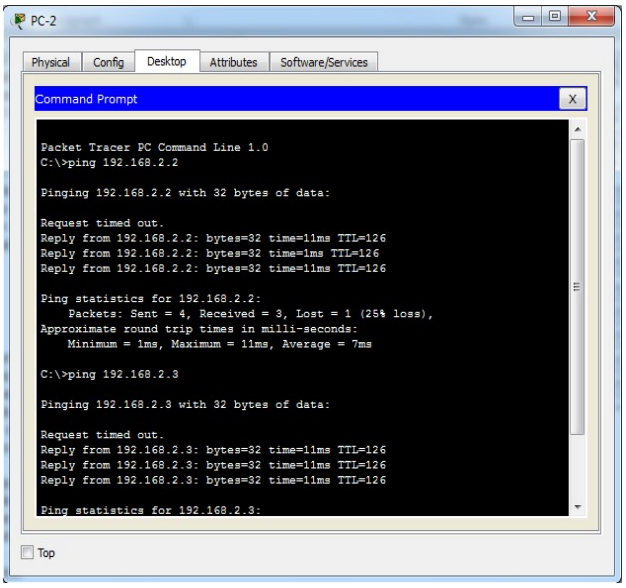

Figure 5 Ping test from PC-2 to PC-4 and PC-5

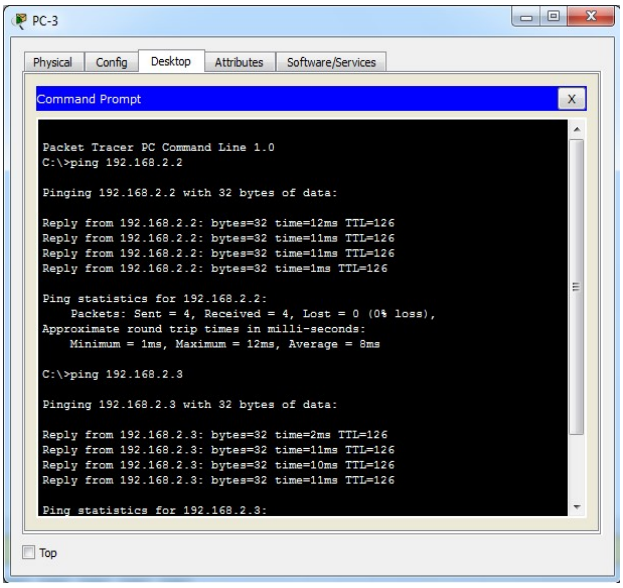

Figure 8 Ping test from PC-3 to PC-4 and PC-5

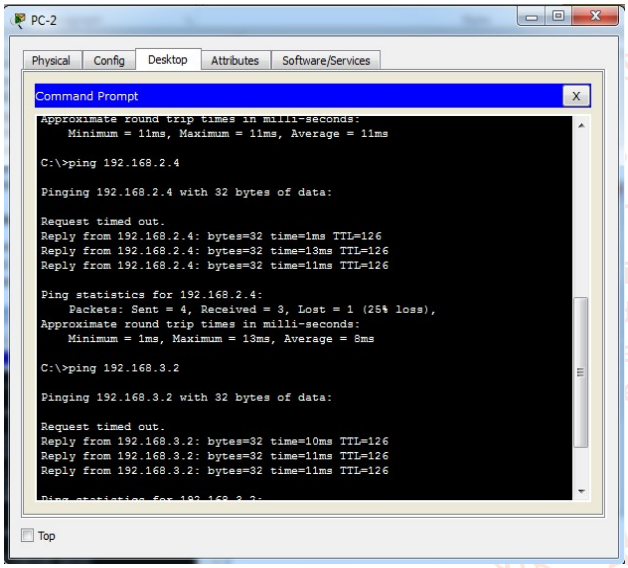

Figure 6 Ping test from PC-2 to PC-6 and PC-7

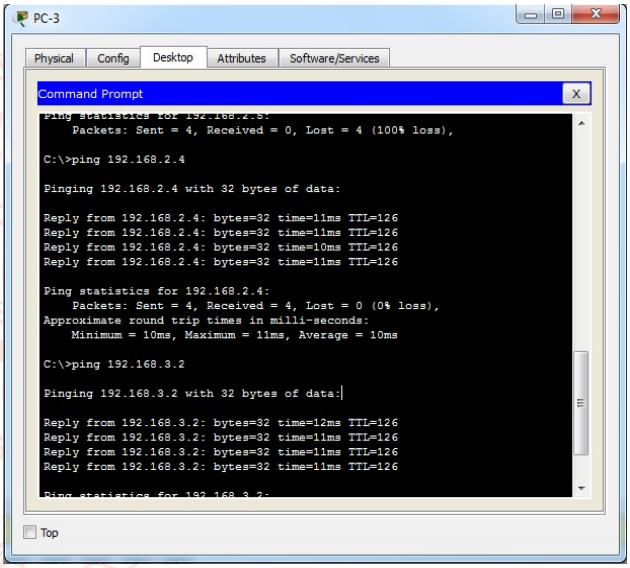

Figure 9 Ping test from PC-3 to PC-6 and PC-7

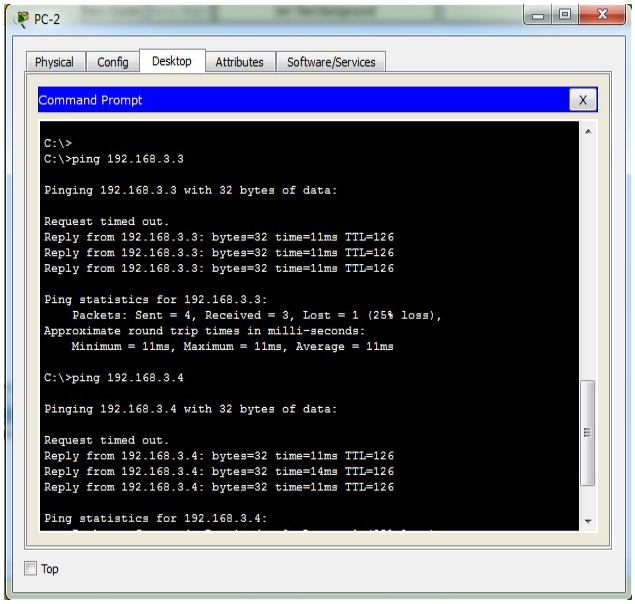

Figure 7 Ping test from PC-2 to PC-8 and PC-9

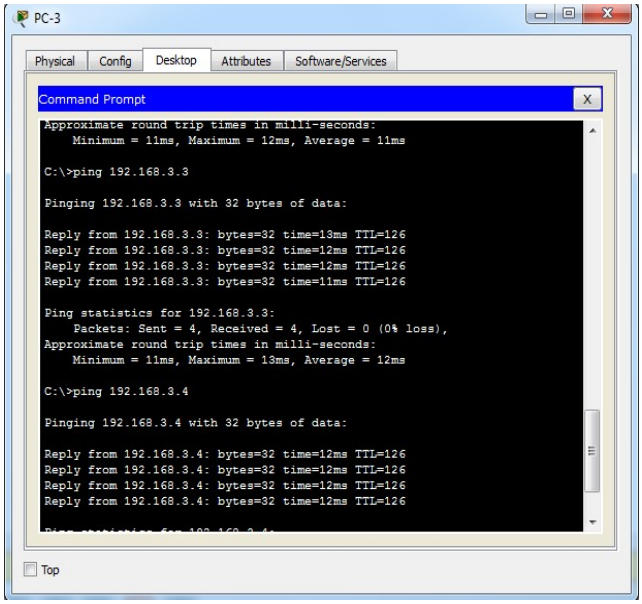

Figure 10 Ping test from PC-3 to PC-8 and PC-9

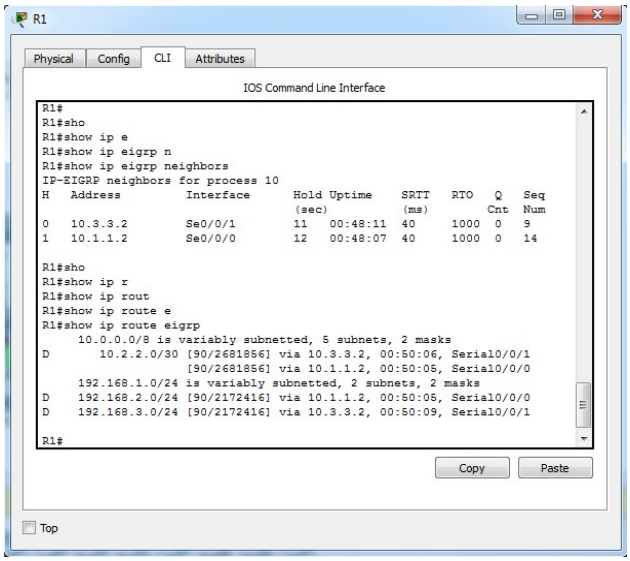

Figure 11 ip eigrp neighbors and ip route eigrp for R1

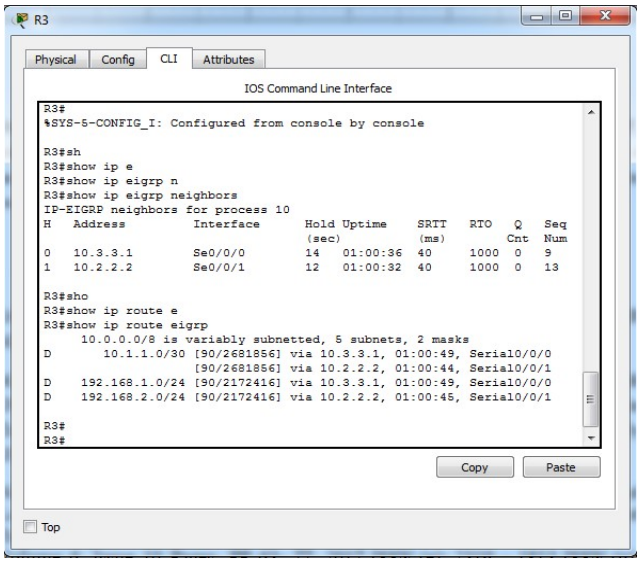

Figure 13 ip eigrp neighbors and ip route eigrp for R3

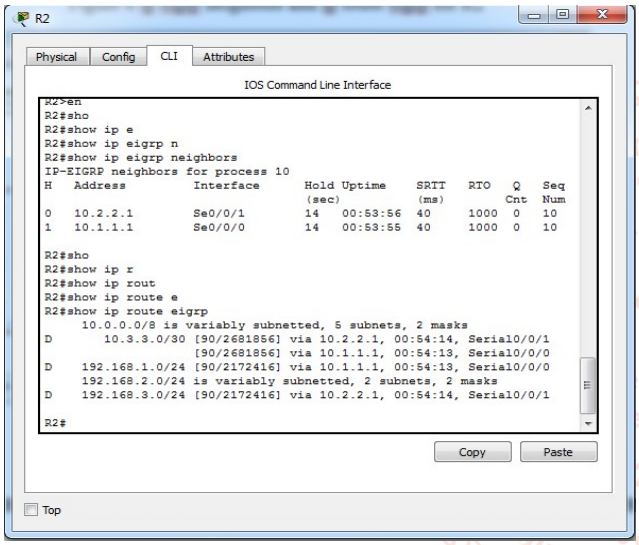

Figure 12 ip eigrp neighbors and ip route eigrp for R2

CONCLUSION

EIGRP provided between networks for communication. EIGRP is an enhanced version of IGRP. The same distance vector technology found in IGRP used in EIGRP and the underlying distance information remains unchanged. The convergence properties and the operating efficiency of this protocol have improved significantly. EIGRP allows for improved architecture while retaining existing investment in IGRP.

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