TCOM 515 IP Routing

Lab4: EIGRP(Enhanced Interior Gateway Routing Protocol) Routing

Kyurim Rhee

Lab Conducted: April 05-2011 (Tue)

Lab Report Submission: April 11-2011

Router: Dallas

Team Members: None

1. Introduction

In order for packets to be routed throughout the network, each router must generate a routing table. This routing table serves as a map to direct which interface the packet needs to be sent at. There are three ways the routing table is created.

- 1. Directly connected interfaces. (C-connected)
- 2. Static routes. (S-static)
- 3. Dynamic routing protocols. (O-OSPF/R-RIP/B-BGP/D-EIGRP)

In this lab, EIGRP(Enhanced Interior Gateway Routing Protocol), will be explored to generate a routing table.

EIGRP(Enhanced Interior Gateway Routing Protocol) is Cisco proprietary IGP(Interior Gateway Protocol). It is a Distance Vector routing protocol which also has link-state characteristics. EIGRP uses DUAL(Diffusing Update ALgorithm). Each node knows only the metric/destinationIP/neighbor that advertised the route of the complete network topology within AS. Has a table of neighbor which contains information on all other directly connected routers.

<REF: Following notes are from TCOM515 Lecture4-EIGRP>

The advantages of EIGRP are:

- Fast convergence
- Uses minimal network resources
- Auto-Summarization
- Authentication
- Classless, supports VLSM(Variable Length Subnet Masking) and CIDR(Classless Inter-Domain Routing)
- Unequal Cost Load Balancing

Topology table-contains all routes advertised by neighbors.

Each entry consists of the metric to the destination address and the neighbor(s) that advertised the destination.

Terminology:

- Feasible Distance(FD) metric for the best path to a destination.
- Successor next hop router. neighbor
- Feasibility condition a neighbor router advertising a path to destination with lower metric than current metric router.
- **Feasible successor** a neighbor router advertising a metric lower than FD to destination.
- Neighbor Table

EIGRP Metric & Paths

- EIGRP metric based on the lowest bandwidth and the total delay on the path to the destination:
- Metric = BW+delay
- BW = (10^7/min(BW)) * 256
- EIGRP can also use load and reliability in addition to BW and delay.

Path Types

- Internal-routes advertised within the EIGRP AS
- External-routes outside of AS (redistribution)

EIGRP Operation (4 major components of EIGRP)

- 1. Protocol-dependent modules
 - Supports IP, IPX and AppleTalk
- 2. Reliable Transport Protocol (RTP not RealTimeProtocol.)
 - Cisco propriety transport protocol for EIGRP packets.
 - Uses multicast 224.0.0.10 to send packets.
 - ACK sent by recipient (neighbor).
 - EIGRP Packet Types:

- Hellos
- ACK
- Updates
- Queries and Replies
- o Multicast used to send first packet. Retransmissions use unicast when lack of ACK by Rx.
- 3. Neighbor discovery/recovery
 - Uses Hello packets to identify itself and find neighbors.
 - Hellos are sent out to EIGRP enabled routers on directly connected networks.
 - Neighbor adjacency will be formed after discovery.
 - If a hello packet is not received by "Hold Time", neighbor is declared down.
 - Neighbors are recorded in a neighbor table.
- 4. Diffusing Update ALgorithm (DUAL)

Router will perform DUAL if feasible successor is found in topology table.

- 1. Router begins diffusing computation by querying all of its neighbors for a **feasible successor**, the route becomes active.
- 2. Neighbor router will check for **FD(Feasible Dist**-metric of best path) in its topology table and send reply back to originating router if one exists.

If no FD exists, the neighbor router will also start the diffusing computation and send queries to its neighbors.

- 3. After receiving replies to its queries, the router will choose new successor and FD.
- If no feasible successor is found, route is declared unreachable.
- 4. Router will then send update with new information to neighbors.

Issues with DUAL

- Timesout for replies to queries is 3 minutes. This can cause SIA(Stuck In Active) routes.
- Neighbors that does not respond will be considered as down.
- Solutions:
 - Route Summarization this will reduce the query range
 - EIGRP stub routing queries are not sent to stub routers.

EIGRP Packet Header

Bits	8	8	16	32	32	32	32	Variable
	Version	Opcode	Checksum	Flags	Sequence	ACK	AS Number	TLVs

- Opcode: EIGRP packet type
 - o 1-Update
 - o 2-Query
 - o 3-Reply
 - o 4-Hello
 - o 5-IPX SAP
- Checksum calculated for the whole EIGRP portion of the IP datagram
- Flags (2 types)
 - Init route in this packet is the first in new neighbor relationship.
 - Conditional Receive used in Reliable Multicasting algorithm.
- Sequence the 32-bit sequence# used by RTP
- ACK
- AS Number The AS# of EIGRP domain.
- TLV(Type/Length/Value) generally used to describe a route.

The route table will contain the following information:

1. Destination Address – network address of a subnet

- 2. Next Hop interface or IP address of next hop in path
- 3. Egress interface the interface to the next hop
- 4. Type of route C-Connect, S-Static, R-RIP, O-OSPF, D-EIGRP
- 5. Metric arbitrary number used to help choose the best route. Cost to the next route.
- Number of Hops number of hops to the destination.
 <*Information from TCOM515 Lecture1>

2. Purpose

The purpose of this lab is to understand how to setup/configure routers for EIGRP network. Understand the routing characteristic unique to EIGRP routing protocol.

3. Procedure

Make Physical Connectivity Between Devices

The six Cisco 2811 ISRs were set up in the topology shown in figure below. The router that I configured was Dallas (192.168.4.4 – loopback address) and made connection as follows:

- Dallas FE0/0.9 ←→ Miami FE0/0.10
- Dallas FE0/0.14 ←→ Paris FE0/1.13





The management network of the routers were connected through the Cisco 2511 (terminal server) and connected to the PC workstations.

NOTE: The following is the color scheme for this lab report:

- Input into the command prompt
- Output of the command prompt
- Comment or syntax of the command

Login to the router. login: student Password:

Router>enable Router#conf t Router(config)#

Changing Host name of the router to "Dallas": Router (config) #hostname Dallas Dallas (config) #

Disabling the DNS lookup for our lab purposes. This prevents long waits for ping wait time as it is not expecting a response from the DNS server:

Dallas(config)#no ip domain lookup

Entering the router's "Global Line Configure Mode":

Dallas(config)#line console 0 Dallas(config-line)#logging synchronous

Configure from the terminal:

Dallas#conf Configuring from terminal, memory, or network [terminal]? t

2. Configure the Router

Configuring the physical interfaces. Based on the below table the connections were made as such:

- Dallas 192.168.0.14/30 ←→ Paris 192.168.0.13/30

Router Name	Loopback0	FastEthernet Interface 0/0 and mask	FastEthernet Interface 0/1 and mask
Brussels	192.168.1.1/32	192.168.0.6/30	192.168.0.25/30
Atlanta	192.168.2.2/32	192.168.0.5/30	192.168.0.21/30
Miami	192.168.3.3/32	192.168.0.10/30	192.168.0.22/30
Dallas	192.168.4.4/32	192.168.0.9/30	192.168.0.14/30
Paris	192.168.5.5/32	192.168.0.18/30	192.168.0.13/30
Seattle	192.168.6.6/32	192.168.0.17/30	192.168.0.26/30

(Configuring FE0/0 Dallas ← → Miami Interface)

Dallas#conf t Enter configuration commands, one per line. End with CNTL/Z. Dallas(config)#interface fastEthernet 0/0 Dallas(config-if)#ip address 192.168.0.9 255.255.255.252 Dallas(config-if)#no shut Dallas(config-if)#exit Dallas(config)#exit Dallas#
*Apr 5 22:50:55.303: %SYS-5-CONFIG_I: Configured from console by console
Dallas#show ip interface brief

Interface	IP-Address	OK?	Method	Status		Protocol
FastEthernet0/0	192.168.0.9	YES	manual	up		up
FastEthernet0/1	unassigned	YES	unset	administratively of	down	down
FastEthernet0/0/0	unassigned	YES	unset	up		down
FastEthernet0/0/1	unassigned	YES	unset	up		down
FastEthernet0/0/2	unassigned	YES	unset	up		down
FastEthernet0/0/3	unassigned	YES	unset	up		down
Serial0/1/0	unassigned	YES	unset	administratively of	down	down
Serial0/1/1	unassigned	YES	unset	administratively of	down	down
Vlan1	unassigned	YES	unset	up		down
SSLVPN-VIF0	unassigned	NO	unset	up		up
Loopback0	192.168.4.4	YES	manual	up		up

(Configuring FE0/1 Dallas ← → Paris Interface)

```
Dallas(config)#interface fast 0/1
Dallas(config-if)#ip address 192.168.0.14 255.255.255.252
Dallas(config-if)#no shut
Dallas(config-if)#exit
Dallas(config)#
*Apr 5 22:52:22.923: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Apr 5 22:52:23.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Dallas(config)#exit
Dallas#
*Apr 5 22:52:29.767: %SYS-5-CONFIG_I: Configured from console by console
Dallas#show ip interface brief
                                         OK? Method Status
                         IP-Address
                                                                          Protocol
Interface
                         192.168.0.9
                                        YES manual up
FastEthernet0/0
                                                                          up
FastEthernet0/1
                          192.168.0.14
                                          YES manual
                                                                          up
                                                    up
FastEthernet0/0/0
                                          YES unset
                         unassigned
                                                    up
                                                                          down
FastEthernet0/0/1
                        unassigned
                                        YES unset up
                                                                          down
                         unassigned
                                        YES unset up
FastEthernet0/0/2
                                                                          down
FastEthernet0/0/3
                         unassigned
                                         YES unset
                                                    up
                                                                          down
Serial0/1/0
                         unassigned
                                        YES unset administratively down down
Serial0/1/1
                         unassigned
                                        YES unset administratively down down
                                        YES unset up
NO unset up
                         unassigned
Vlan1
                                                                          down
                         unassigned
SSLVPN-VIF0
                                                                          up
Loopback0
                         192.168.4.4 YES manual up
                                                                          up
```

(Configuring Loopback Interface)

Loopback is a logical interface. To configure, type:

```
Dallas(config-if)#interface loop 0
Dallas(config-if)#
*Apr 5 22:47:30.219: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
Dallas(config-if)#ip address 192.168.4.4 255.255.255
Dallas(config-if)#no shut
Dallas(config-if)#end
```

3.1 The interfaces, FastE0/0, FastE0/1 and Loopback0, which were configured, are up.

Pinging my neighbors:

Pinging Connected Interface (Miami):

```
Dallas#ping 192.168.0.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

Pinging Connected Interface (Paris):

Dallas#ping 192.168.0.13
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.13, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms

3.2 What does the route table look like?

Checking my current route table:

Dallas#show ip route Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
192.168.4.0/32 is subnetted, 1 subnets
C 192.168.4.4 is directly connected, Loopback0
192.168.0.0/30 is subnetted, 2 subnets
C 192.168.0.8 is directly connected, FastEthernet0/0
C 192.168.0.12 is directly connected, FastEthernet0/1
```

There are only 2 physically connected 1 loopback entries. All three addresses are logically connected, hence we see 3 connected on the on the route table.

Configure EIGRP (Part4)

(Turning on EIGRP)

In Global Config Mode type:

Format:

Dallas(config-router)<FE0/1 NETWORK IP> 255.255.255.255.252

```
Dallas(config)#router eigrp 1
Dallas(config-router)#network 192.168.0.10 255.255.255.252
Dallas(config-router)#
*Apr 5 23:08:24.735: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.10 (FastEthernet0/0) is up: new
adjacency
```

```
Dallas(config-router)#network 192.168.0.13 255.255.252
Dallas(config-router)#
*Apr 5 23:08:48.379: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.13 (FastEthernet0/1) is up: new
adjacency
```

```
Dallas(config-router)#network 192.168.4.4 255.255.255
Dallas(config-router)#no auto-summary
Dallas(config-router)#
*Apr 5 23:09:30.655: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.10 (FastEthernet0/0) is resync:
summary configured
*Apr 5 23:09:30.655: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.13 (FastEthernet0/1) is resync:
summary configured
```

4.1 How many entries are now visible in the IP route table? How has the table changed from section3?

All the connected remained the same.

There are 9 new D-EIGRP routes available. 5 LoopbacksIP of each router + 4 networks that I'm not directly connected to.

```
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2 E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
C
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:13:25, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
        192.168.6.6 [90/158720] via 192.168.0.13, 00:13:25, FastEthernet0/1
D
     192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
        192.168.0.12 is directly connected, FastEthernet0/1
С
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:13:26, FastEthernet0/0
        192.168.0.24 [90/33280] via 192.168.0.13, 00:13:26, FastEthernet0/1
D
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:13:26, FastEthernet0/1
        192.168.0.20 [90/30720] via 192.168.0.10, 00:13:26, FastEthernet0/0
D
     192.168.1.0/32 is subnetted, 1 subnets
D
        192.168.1.1 [90/161280] via 192.168.0.13, 00:13:27, FastEthernet0/1
                     [90/161280] via 192.168.0.10, 00:13:27, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
        192.168.2.2 [90/158720] via 192.168.0.10, 00:02:36, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
        192.168.3.3 [90/156160] via 192.168.0.10, 00:13:27, FastEthernet0/0
```

```
Dallas#
Dallas######### error fixed. Seattle back to 192.168.2.2 with correct subnet
Dallas#
Dallas#show ip route 192.168.0.8
Routing entry for 192.168.0.8/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
 Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/0
     Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip route 192.168.0.20
Routing entry for 192.168.0.20/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
 Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:14:17 ago
 Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:14:17 ago, via FastEthernet0/0
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip route 192.168.0.4
Routing entry for 192.168.0.4/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:14:23 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:14:23 ago, via FastEthernet0/0
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.24
Routing entry for 192.168.0.24/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:14:29 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:14:29 ago, via FastEthernet0/1
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.16
Routing entry for 192.168.0.16/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:14:35 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:14:35 ago, via FastEthernet0/1
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip protocol
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
   192.168.0.8/30
    192.168.0.12/30
    192.168.4.4/32
  Routing Information Sources:
    Gatewav
                   Distance
                                 Last Update
```

(this router) 90 00:14:13 192.168.0.10 90 00:03:54 192.168.0.13 90 00:03:54 Distance: internal 90 external 170 Dallas# Dallas#show ip eigrp topology IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4) Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply, r - reply Status, s - sia Status

P 192.168.0.8/30, 1 successors, FD is 28160 via Connected, FastEthernet0/0

P 192.168.0.12/30, 1 successors, FD is 28160

via Connected, FastEthernet0/1
P 192.168.2.2/32, 1 successors, FD is 158720

via 192.168.0.10 (158720/156160), FastEthernet0/0
P 192.168.4.4/32, 1 successors, FD is 128256

via Connected, Loopback0

P 192.168.5.5/32, 1 successors, FD is 156160
 via 192.168.0.13 (156160/128256), FastEthernet0/1
P 192.168.1.1/32, 2 successors, FD is 161280
 via 192.168.0.10 (161280/158720), FastEthernet0/0
 via 192.168.0.13 (161280/158720), FastEthernet0/1
P 192.168.6.6/32, 1 successors, FD is 158720
 via 192.168.0.13 (158720/156160), FastEthernet0/1

P 192.168.3.3/32, 1 successors, FD is 156160
 via 192.168.0.10 (156160/128256), FastEthernet0/0
P 192.168.0.4/30, 1 successors, FD is 33280
 via 192.168.0.10 (33280/30720), FastEthernet0/0

P 192.168.0.24/30, 1 successors, FD is 33280 via 192.168.0.13 (33280/30720), FastEthernet0/1 P 192.168.0.16/30, 1 successors, FD is 30720 via 192.168.0.13 (30720/28160), FastEthernet0/1 P 192.168.0.20/30, 1 successors, FD is 30720

via 192.168.0.10 (30720/28160), FastEthernet0/0

4.2 Who are your EIGRP neighbors?

EIGRP neighbors are 192.168.0.10(Miami FEO/0 interface) and 192.168.0.13(Paris FEO/1 interface) Dallas#

Dallas#show ip eigrp neighbors IP-EIGRP neighbors for process 1

Н	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
			(sec)		(ms)		Cnt	Num
1	192.168.0.13	Fa0/1	12	00:15:13	4	200	0	31
0	192.168.0.10	Fa0/0	14	00:15:36	1	200	0	43

1 successors,

4.3 Take an entry from the topology table and decipher each part of it.

Format: Passive DestinationNetworkIP, #ofNextHopRouter, Metric BestPath Interface reachable by (metricPathFD/Fes.Suc) P 192.168.0.4/30, 1 successors, FD is 33280 via 192.168.0.10 (33280/30720), FastEthernet0/0

via Connected, FastEthernet0/0

FD is 28160

P 192.168.0.8/30,

• Feasible Distance(FD) - metric for the best path to a destination.

• Successor - next hop router. Neighbor.

4.4 Take one EIGRP route entry from the IP route table and decipher each part of it

EIGRP	DestNetworkIP	[AdminDis	st/Metric] via	NextHopInterfaceIP,	LastUpdateTime,	ReachableByInterface
D	192.168.0.4	[90	/33280] via	192.168.0.10,	00:13:26,	FastEthernet0/0

4.5 What are the two types of EIGRP route entry from the IP route table and decipher each part. Two types can be categorized as:

1. Feasible Distance – Best path with best metric (Largest Metric)

2. Feasible Successor – neighbor advertising a metric lower than FD to destination.

```
IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30
State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
Routing Descriptor Blocks:
Feasible Distance
192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
Composite metric is (33280/30720), Route is Internal
```

```
Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
Feasible Successor
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
     Composite metric is (35840/33280), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
```

You could also be referring to "Path types". Two types of path types are:

- 1. Internal-routes within EIGRP AS
- 2. External-routes outside of AS

All our routes would indicate internal-routes as we are only dealing within an AS in the scope of this lab.

```
Dallas#
Dallas## Passive means that...
Dallas## there is no traffic passing. It has already converged
Dallas#
Dallas#show ip eigrp topology 192.168.0.8/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.8/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
       Total delay is 100 microseconds
       Reliability is 255/255
       Load is 1/255
       Minimum MTU is 1500
       Hop count is 0
Dallas#
Dallas#show ip eigrp topology 192.168.0.20/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.20/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
       Reliability is 255/255
       Load is 1/255
       Minimum MTU is 1500
       Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.4/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 2
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
       Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
```

```
Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.16/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.16/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.12/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.12/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/1), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 0
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 4 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
```

4.7 What is the FD (feasible distance) to your destination(Seattle loopback 192.168.6.3)?
 Feasible Distance is calculated as follows:
 FD (Seattle Loopback-192.168.6.3) = 33280

- FD = max(BW+delay)
- BW = 256*10^7/min(BW of all links in path. i.e., weakest link)
- Delay = 256*total delay

4.8 What is your paths to Seattle?

Path of FD:

192.168.0.13→192.168.0.17→192.168.6.6

There is an alternate route, but traceroute will find the best path (FD) and not use this path: $192.168.0.10 \rightarrow 192.168.0.21 \rightarrow 192.168.0.6 \rightarrow 192.168.0.26 \rightarrow 192.168.6.6$

Link turned up between Seattle S0/1/0 (192.168.0.30) ←→ Miami S0/1/0 (192.168.0.29)

5.2 at bottom.

```
Dallas###### 5. Turn up on additional link
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:35:24, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
D
        192.168.6.6 [90/158720] via 192.168.0.13, 00:35:24, FastEthernet0/1
     192.168.0.0/30 is subnetted, 7 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
        192.168.0.12 is directly connected, FastEthernet0/1
С
        192.168.0.4 [90/33280] via 192.168.0.10, 00:35:25, FastEthernet0/0
D
D
        192.168.0.24 [90/33280] via 192.168.0.13, 00:35:25, FastEthernet0/1
        192.168.0.28 [90/20514560] via 192.168.0.10, 00:00:11, FastEthernet0/0
192.168.0.16 [90/30720] via 192.168.0.13, 00:35:25, FastEthernet0/1
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:35:26, FastEthernet0/0
D
     192.168.1.0/32 is subnetted, 1 subnets
        192.168.1.1 [90/161280] via 192.168.0.13, 00:35:28, FastEthernet0/1
D
                     [90/161280] via 192.168.0.10, 00:35:28, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
       192.168.2.2 [90/158720] via 192.168.0.10, 00:24:36, FastEthernet0/0
D
     192.168.3.0/32 is subnetted, 1 subnets
D
        192.168.3.3 [90/156160] via 192.168.0.10, 00:35:28, FastEthernet0/0
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#ping 192.168.0.16
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.16, timeout is 2 seconds:
11111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#
Dallas#ping 192.168.0.28
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.28, timeout is 2 seconds:
11111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 4 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas## Note on the 192.168.0.28, the metric is huge: metric = 20514560
Dallas## Metic - the lower the better
Dallas## metric is very big as the serial link has a small bandwidth
Dallas## When traceroute is done, it won't send through the serial link as the
Dallas#
Dallas#show ip route 192.168.0.8
Routing entry for 192.168.0.8/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
```

Routing Descriptor Blocks: * directly connected, via FastEthernet0/0 Route metric is 0, traffic share count is 1 Dallas# Dallas#show ip route 192.168.0.20 Routing entry for 192.168.0.20/30 Known via "eigrp 1", distance 90, metric 30720, type internal Redistributing via eigrp 1 Last update from 192.168.0.10 on FastEthernet0/0, 00:49:10 ago Routing Descriptor Blocks: * 192.168.0.10, from 192.168.0.10, 00:49:10 ago, via FastEthernet0/0 Route metric is 30720, traffic share count is 1 Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit Reliability 255/255, minimum MTU 1500 bytes Loading 1/255, Hops 1 Dallas# Dallas#show ip route 192.168.0.24 Routing entry for 192.168.0.24/30 Known via "eigrp 1", distance 90, metric 33280, type internal Redistributing via eigrp 1 Last update from 192.168.0.13 on FastEthernet0/1, 00:49:16 ago Routing Descriptor Blocks: * 192.168.0.13, from 192.168.0.13, 00:49:16 ago, via FastEthernet0/1 Route metric is 33280, traffic share count is 1 Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit Reliability 255/255, minimum MTU 1500 bytes Loading 1/255, Hops 2 Dallas# Dallas#show ip route 192.168.0.4 Routing entry for 192.168.0.4/30 Known via "eigrp 1", distance 90, metric 33280, type internal Redistributing via eigrp 1 Last update from 192.168.0.10 on FastEthernet0/0, 00:49:25 ago Routing Descriptor Blocks: * 192.168.0.10, from 192.168.0.10, 00:49:25 ago, via FastEthernet0/0 Route metric is 33280, traffic share count is 1 Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit Reliability 255/255, minimum MTU 1500 bytes Loading 1/255, Hops 2 Dallas# Dallas#show ip route 192.168.0.28 Routing entry for 192.168.0.28/30 Known via "eigrp 1", distance 90, metric 20514560, type internal Redistributing via eigrp 1 Last update from 192.168.0.10 on FastEthernet0/0, 00:14:15 ago Routing Descriptor Blocks: * 192.168.0.10, from 192.168.0.10, 00:14:15 ago, via FastEthernet0/0 Route metric is 20514560, traffic share count is 1 Total delay is 20100 microseconds, minimum bandwidth is 128 Kbit Reliability 255/255, minimum MTU 1500 bytes Loading 1/255, Hops 1 Dallas# Dallas#show ip route 192.168.0.16 Routing entry for 192.168.0.16/30 Known via "eigrp 1", distance 90, metric 30720, type internal Redistributing via eigrp 1 Last update from 192.168.0.13 on FastEthernet0/1, 00:49:35 ago Routing Descriptor Blocks: * 192.168.0.13, from 192.168.0.13, 00:49:35 ago, via FastEthernet0/1 Route metric is 30720, traffic share count is 1 Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit Reliability 255/255, minimum MTU 1500 bytes Loading 1/255, Hops 1 Dallas# Dallas#show ip route 192.168.0.12 Routing entry for 192.168.0.12/30 Known via "connected", distance 0, metric 0 (connected, via interface) Redistributing via eigrp 1 Routing Descriptor Blocks: * directly connected, via FastEthernet0/1 Route metric is 0, traffic share count is 1 Dallas# Dallas#show ip protocols Routing Protocol is "eigrp 1" Outgoing update filter list for all interfaces is not set Incoming update filter list for all interfaces is not set Default networks flagged in outgoing updates Default networks accepted from incoming updates EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0

EIGRP maximum hopcount 100 EIGRP maximum metric variance 1 Redistributing: eigrp 1 EIGRP NSF-aware route hold timer is 240s Automatic network summarization is not in effect Maximum path: 4 Routing for Networks: 192.168.0.8/30 192.168.0.12/30 192.168.4.4/32 Routing Information Sources: Gateway Distance Last Update 90 00:49:24 (this router) 192.168.0.10 90 00:14:43 90 00:14:43 192.168.0.13 Distance: internal 90 external 170 Dallas# Dallas#show ip eigrp neighbors IP-EIGRP neighbors for process 1 H Address Interface Hold Uptime SRTT RTO Q Seq (sec) (ms) Cnt Num 13 00:50:08 2 200 0 32 1 192.168.0.13 Fa0/1 0 192.168.0.10 Fa0/0 11 00:50:32 1 200 0 49 Dallas# Dallas#show ip eigrp topology IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4) Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply, r - reply Status, s - sia Status P 192.168.0.8/30, 1 successors, FD is 28160 via Connected, FastEthernet0/0 P 192.168.0.12/30, 1 successors, FD is 28160 via Connected, FastEthernet0/1 P 192.168.2.2/32, 1 successors, FD is 158720 via 192.168.0.10 (158720/156160), FastEthernet0/0 P 192.168.4.4/32, 1 successors, FD is 128256 via Connected, Loopback0 P 192.168.5.5/32, 1 successors, FD is 156160 via 192.168.0.13 (156160/128256), FastEthernet0/1 P 192.168.1.1/32, 2 successors, FD is 161280 via 192.168.0.10 (161280/158720), FastEthernet0/0 via 192.168.0.13 (161280/158720), FastEthernet0/1 P 192.168.6.6/32, 1 successors, FD is 158720 via 192.168.0.13 (158720/156160), FastEthernet0/1 P 192.168.3.3/32, 1 successors, FD is 156160 via 192.168.0.10 (156160/128256), FastEthernet0/0 P 192.168.0.4/30, 1 successors, FD is 33280 Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply, r - reply Status, s - sia Status via 192.168.0.10 (33280/30720), FastEthernet0/0 P 192.168.0.24/30, 1 successors, FD is 33280 via 192.168.0.13 (33280/30720), FastEthernet0/1 P 192.168.0.28/30, 1 successors, FD is 20514560 via 192.168.0.10 (20514560/20512000), FastEthernet0/0 P 192.168.0.16/30, 1 successors, FD is 30720 via 192.168.0.13 (30720/28160), FastEthernet0/1 P 192.168.0.20/30, 1 successors, FD is 30720 via 192.168.0.10 (30720/28160), FastEthernet0/0 Dallas# Dallas#show ip eigrp topology 192.168.0.8/30 IP-EIGRP (AS 1): Topology entry for 192.168.0.8/30 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160 Routing Descriptor Blocks: 0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0 Composite metric is (28160/0), Route is Internal Vector metric: Minimum bandwidth is 100000 Kbit Total delay is 100 microseconds Reliability is 255/255 Load is 1/255 Minimum MTU is 1500 Hop count is 0 Dallas# Dallas#show ip eigrp topology 192.168.0.20/30 IP-EIGRP (AS 1): Topology entry for 192.168.0.20/30 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720 Routing Descriptor Blocks: 192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0 Composite metric is (30720/28160), Route is Internal

```
Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.4/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
       Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.16/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.16/30
```

```
State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
       Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
       Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.12/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.12/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/1), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 0
```

5.2 What commands were used to turn up EIGRP on the additional link?

Turn up interface:

```
Dallas#conf t
Enter configuration commands, one per line. End with CNTL/2.
Miami(config)#interface serial 0/1/0
Miami(config-if)#ip address 192.168.0.28 255.255.255.252
Miami(config-if)#no shut
Miami(config-if)#exit
Miami(config)#exit
```

Configure EIGRP:

```
Format:
Miami(config-router)<FE0/1 NETWORK IP> 255.255.255.255.255
Miami(config) #router eigrp 1
Miami(config-router) #network 192.168.0.30 255.255.255
Miami(config-router) #no auto-summary
```

5.3 Has the feasible distance and path to your destination changed? If so, how?

5.4 What is/your path(s)? Has this changed?

Even though the serial link was brought up, it did not change the FD path as the serial link has much less BW compared to the Ethernet links.

As seen by the trace route, the optimal path is as follows:

```
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
1 192.168.0.13 0 msec 0 msec 4 msec
2 192.168.0.17 0 msec * 0 msec
Path of FD:
```

```
192.168.0.13→192.168.0.17→192.168.6.6
```

Other Alternate path with suboptimal metric: 192.168.0.10 \rightarrow 192.168.0.21 \rightarrow 192.168.0.6 \rightarrow 192.168.0.26 \rightarrow 192.168.6.6 Alternate path suboptimal path(serial link): 192.168.0.10 \rightarrow 192.168.0.30 \rightarrow 192.168.6.6 Additional Lab Questions:

1. What was the most important piece of knowledge you took away from this lab?

EIGRP is a distance-vector protocol that has link-state characteristics. Generic distance vector protocol such as RIP does not know the state of the entire topology. EIGRP is a distance-vector protocol, however know the metrics of the entire topology within it's routing domain much like link-state protocol. This enables EIGRP's routing protocol to converge at a fast unlike the conventional distance vector protocol such as RIP.

2. What new command did you find most useful and why? Configuring EIGRP. It is used to configure EIGRP routing protocol. Format: Miami (config-router) <FE0/1 NETWORK IP> 255.255.255.255.252 Miami (config) #router eigrp 1 Miami (config-router) #network 192.168.0.30 255.255.255.252 Miami (config-router) #no auto-summary

3. Identify at least one problem you experienced in this lab. How did you figure out the problem? How did you resolve it? In Part4, when instructed to configure EIGRP routing protocol, we could not ping 192.168.2.2 loopback. We identified that there were configuration error in loopback address and subnet mask and resolved the problem.

```
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
       192.168.4.4 is directly connected, Loopback0
C
    192.168.5.0/32 is subnetted, 1 subnets
       192.168.5.5 [90/156160] via 192.168.0.13, 00:07:47, FastEthernet0/1
D
    192.168.6.0/32 is subnetted, 1 subnets
D
       192.168.6.6 [90/158720] via 192.168.0.13, 00:07:47, FastEthernet0/1
    192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
        192.168.0.12 is directly connected, FastEthernet0/1
       192.168.0.4 [90/33280] via 192.168.0.10, 00:07:48, FastEthernet0/0
D
D
       192.168.0.24 [90/33280] via 192.168.0.13, 00:07:48, FastEthernet0/1
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:07:48, FastEthernet0/1
       192.168.0.20 [90/30720] via 192.168.0.10, 00:07:48, FastEthernet0/0
D
    192.168.1.0/32 is subnetted, 1 subnets
      192.168.1.1 [90/161280] via 192.168.0.13, 00:07:49, FastEthernet0/1
D
                    [90/161280] via 192.168.0.10, 00:07:49, FastEthernet0/0
    192.168.2.0/30 is subnetted, 1 subnets
D
       192.168.2.0 [90/158720] via 192.168.0.10, 00:07:49, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
D
       192.168.3.3 [90/156160] via 192.168.0.10, 00:07:49, FastEthernet0/0
Dallas#
Dallas########## error on seattle's loopback?
Dallas########## wrong subnet mask and wrong loopback IP for Atlanta
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
    192.168.4.0/32 is subnetted, 1 subnets
       192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
       192.168.5.5 [90/156160] via 192.168.0.13, 00:13:25, FastEthernet0/1
    192.168.6.0/32 is subnetted, 1 subnets
       192.168.6.6 [90/158720] via 192.168.0.13, 00:13:25, FastEthernet0/1
D
    192.168.0.0/30 is subnetted, 6 subnets
С
       192.168.0.8 is directly connected, FastEthernet0/0
С
       192.168.0.12 is directly connected, FastEthernet0/1
D
       192.168.0.4 [90/33280] via 192.168.0.10, 00:13:26, FastEthernet0/0
D
       192.168.0.24 [90/33280] via 192.168.0.13, 00:13:26, FastEthernet0/1
D
       192.168.0.16 [90/30720] via 192.168.0.13, 00:13:26, FastEthernet0/1
D
       192.168.0.20 [90/30720] via 192.168.0.10, 00:13:26, FastEthernet0/0
```

auto-summary (RIP)

To restore the default behavior of automatic summarization of subnet routes into network-level routes, use the **auto-summary** command in router configuration mode. To disable this function and send subprefix routing information across classful network boundaries, use the **no** form of this command.

auto-summary

no auto-summary

Source: http://www.cisco.com/en/US/docs/ios/12 1/iproute/command/reference/1rdrip.html#wp1017389

iOS Command Prompt Script:

login: student Password: program load complete, entry point: 0x8000f000, size: 0x3539494 ***** ***** **** ################################ [OK] Smart Init is enabled smart init is sizing iomem MEMORY_REQ ID TYPE 0X00473800 C2811 Mainboard 0003E7 0X000C2800 4-port FE Switch HWIC 000056 0X00264050 Onboard VPN 0X000021B8 Onboard USB 0X002C29F0 public buffer pools 0X00211000 public particle pools TOTAL: 0X00C6FBF8 If any of the above Memory Requirements are "UNKNOWN", you may be using an unsupported configuration or there is a software problem and system operation may be compromised. Rounded IOMEM up to: 14Mb. Using 5 percent iomem. [14Mb/256Mb] Restricted Rights Legend Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013. cisco Systems, Inc. 170 West Tasman Drive San Jose, California 95134-1706 Cisco IOS Software, 2800 Software (C2800NM-ADVIPSERVICESK9-M), Version 12.4(20)T , RELEASE SOFTWARE (fc3) Technical Support: http://www.cisco.com/techsupport Copyright (c) 1986-2008 by Cisco Systems, Inc. Compiled Thu 10-Jul-08 22:00 by prod rel team This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately. A summary of U.S. laws governing Cisco cryptographic products may be found at: http://www.cisco.com/wwl/export/crypto/tool/stgrg.html If you require further assistance please contact us by sending email to export@cisco.com. Installed image archive Cisco 2811 (revision 49.46) with 247808K/14336K bytes of memory. Processor board ID FTX1035A1KF 6 FastEthernet interfaces 2 Low-speed serial(sync/async) interfaces 1 Virtual Private Network (VPN) Module DRAM configuration is 64 bits wide with parity enabled. 239K bytes of non-volatile configuration memory. 62720K bytes of ATA CompactFlash (Read/Write) --- System Configuration Dialog ---Would you like to enter the initial configuration dialog? [yes/no]: % Please answer 'yes' or 'no'. Would you like to enter the initial configuration dialog? [yes/no]: n Press RETURN to get started! *Apr 5 22:40:26.667: %ESWMRVL FLTMG-5-NOTICE: Notice: FPGA Rev 0x71 *Apr 5 22:40:45.663: %VPN HW-6-INFO LOC: Crypto engine: onboard 0 State changed to: Initialized *Apr 5 22:40:45.671: %VPN_HW-6-INFO_LOC: Crypto engine: onboard 0 State changed to: Enabled 5 22:40:47.523: %LINEPROTO-5-UPDOWN: Line protocol on Interface VoIP-Null0, changed state to up *Apr *Apr 5 22:40:47.527: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up *Apr 5 22:40:47.527: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up *Apr 5 22:40:47.527: %LINK-3-UPDOWN: Interface Serial0/1/0, changed state to down 5 22:40:47.527: %LINK-3-UPDOWN: Interface Serial0/1/1, changed state to down *Apr *Apr 5 22:40:47.527: %LINEPROTO-5-UPDOWN: Line protocol on Interface SSLVPN-VIF0, changed state to up 5 22:40:48.011: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to down *Apr 5 22:40:49.063: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEtherne *Apr

```
Router>t0/0, changed state to up
*Apr 5 22:40:49.063: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
*Apr 5 22:40:49.063: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
     5 22:40:49.063: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to down
*Apr
*Apr 5 22:41:07.311: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 2800 Software (C2800NM-ADVIPSERVICESK9-M), Version 12.4(20)T, RELEASE SOFTWARE (fc3)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2008 by Cisco Systems, Inc.
Compiled Thu 10-Jul-08 22:00 by prod rel team
*Apr 5 22:41:07.319: %SNMP-5-COLDSTART: SNMP agent on host Router is undergoing a cold start
*Apr 5 22:41:07.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Apr 5 22:41:07.551: %CRYPTO-6-GDOI ON OFF: GDOI is OFF
*Apr 5 22:41:07.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
     5 22:41:07.551: %CRYPTO-6-GDOI ON OFF: GDOI is OFF
*Apr
*Apr 5 22:41:08.067: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state to administratively down
*Apr 5 22:41:08.067: %LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively down
*Apr 5 22:41:08.067: %LINK-5-CHANGED: Interface Serial0/1/0, changed state to administratively down
     5 22:41:08.067: %LINK-5-CHANGED: Interface Serial0/1/1, changed state to administratively down
*Apr
*Apr 5 22:41:08.295: %LINK-3-UPDOWN: Interface FastEthernet0/0/3, changed state to up
*Apr 5 22:41:08.299: %LINK-3-UPDOWN: Interface FastEthernet0/0/2, changed state to up
     5 22:41:08.299: %LINK-3-UPDOWN: Interface FastEthernet0/0/1, changed state to up
*Apr
*Apr 5 22:41:08.299: %LINK-3-UPDOWN: Interface FastEthernet0/0/0, changed state to up
*Apr 5 22:41:09.067: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to down
*Apr 5 22:41:09.295: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/3, changed state to down
*Apr
     5 22:41:09.295: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/2, changed state to down
*Apr 5 22:41:09.299: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/1, changed state to down
*Apr 5 22:41:09.299: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0/0, changed state to down
Router>
Router>
Router>
Router>enable
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config) #hostname Dallas
Dallas(config) #no ip domain lookup
Dallas(config)#line console 0
Dallas(config-line)#logging synchronous
Dallas(config-line)#conf t
% Invalid input detected at '^' marker.
Dallas (config-line) #exit
Dallas(config)#conf t
% Invalid input detected at '^' marker.
Dallas(config)#exit
Dallas#conf
*Apr 5 22:43:10.387: %SYS-5-CONFIG I: Configured from console by console
Dallas#conf
Configuring from terminal, memory, or network [terminal]? t
Enter configuration commands, one per line. End with CNTL/Z.
Dallas(config)#interface fastEthernet 0/0
Dallas(config-if)#ip address 192.168.0.9 255.255.255.252
Dallas(config-if)#no shut
Dallas(config-if)#
*Apr 5 22:46:29.679: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state t
an o
*Apr 5 22:46:30.679: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to up
NOTE: Did not exit FE0/0 config, hence wrote over FE0/0 with FE0/1 config.
Dallas(config-if)#ip address 192.168.0.14 255.255.255.252
Dallas(config-if)#no shut
Dallas(config-if)#interface loop 0
Dallas(config-if)#
*Apr 5 22:47:30.219: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0,
changed state to up
Dallas(config-if)#ip address 192.168.4.4 255.255.255.255
Dallas(config-if)#no shut
Dallas(config-if)#end
Dallas#
*Apr 5 22:48:31.935: %SYS-5-CONFIG I: Configured from console by console
Dallas#show ip interface brief
Interface
                          IP-Address
                                           OK? Method Status
                                                                             Protocol
FastEthernet0/0
                           192.168.0.14
                                           YES manual up
                                         YES manuar up
YES unset administratively down down
down
                                                                             up
FastEthernet0/1
                          unassigned
                                         YES unset up
FastEthernet0/0/0
                         unassigned
                                                                             down
                                           YES unset up
FastEthernet0/0/1
                          unassigned
                                                                             down
FastEthernet0/0/2
                           unassigned
                                           YES unset
                                                                             down
                                                      up
                          unassigned
                                         YES unset up
FastEthernet0/0/3
                                                                             down
```

```
unassigned YES unset administratively down down
unassigned YES unset administratively down down
Serial0/1/0
Serial0/1/1
                                   unassigned YES unset up
unassigned NO unset up
192.168.4.4 YES manual up
                                                         YES unset up
NO unset up
Vlan1
                                                                                                      down
SSLVPN-VIF0
                                                                                                      up
Loopback0
                                                                                                      up
Dallas## made error. fix FastE 0/0 and 0/1
Dallas#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Dallas(config)#interface fastEthernet 0/0
Dallas(config-if)#ip address 192.168.0.9 255.255.255.252
Dallas(config-if)#no shut
Dallas(config-if)#exit
Dallas (config) #exit
Dallas#
*Apr 5 22:50:55.303: %SYS-5-CONFIG I: Configured from console by console
Dallas#show ip interface brief
                            IP-AddressOK? Method StatusProto192.168.0.9YES manual upupunassignedYES unset administratively down downunassignedYES unset upunassignedYES unset administratively down downunassignedYES unset upunassignedYES unset upunassignedYES unset upunassignedYES unset upunassignedYES unset upunassignedYES unset upupup192.168.4.4YES manual upupup
Interface
                                                                                                      Protocol
FastEthernet0/0
FastEthernet0/1
FastEthernet0/0/0
FastEthernet0/0/1
FastEthernet0/0/2
FastEthernet0/0/3
Serial0/1/0
Serial0/1/1
Vlan1
SSLVPN-VIF0
Loopback0
Dallas## fixed FE0/0
Dallas## fixing FE 0/1
Dallas#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Dallas(config)#interface fast 0/1
Dallas(config-if)#ip address 192.168.0.14 255.255.255.252
Dallas(config-if)#no shut
Dallas(config-if)#exit
Dallas(config)#
*Apr 5 22:52:22.923: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Apr 5 22:52:23.923: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
Dallas(config)#exit
Dallas#
*Apr 5 22:52:29.767: %SYS-5-CONFIG I: Configured from console by console
Dallas#show ip interface brief
Interface
                                   IP-Address
                                                         OK? Method Status
                                                                                                      Protocol
                        IP-Address OK? Method Sta
192.168.0.9 YES manual up
                             192.168.0.9YES manual upup192.168.0.14YES manual upupunassignedYES unset updownunassignedYES unset administratively down downunassignedYES unset updownunassignedYES unset upupunassignedYES unset upupunassignedYES unset upupup192.168.4.4YES manual upup
FastEthernet0/0
                                                                                                      up
FastEthernet0/1
FastEthernet0/0/0
FastEthernet0/0/1
FastEthernet0/0/2
FastEthernet0/0/3
Serial0/1/0
Serial0/1/1
Vlan1
SSLVPN-VIF0
Loopback0
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
         D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
         E1 - OSPF external type 1, E2 - OSPF external type 2
         i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
         ia - IS-IS inter area, * - candidate default, U - per-user static route
         o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
      192.168.4.0/32 is subnetted, 1 subnets
          192.168.4.4 is directly connected, Loopback0
      192.168.0.0/30 is subnetted, 2 subnets
С
          192.168.0.8 is directly connected, FastEthernet0/0
          192.168.0.12 is directly connected, FastEthernet0/1
С
Dallas#
Dallas#ping 192.068.3.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.68.3.3, timeout is 2 seconds:
Success rate is 0 percent (0/5)
Dallas#
```

```
Dallas#ping 192.168.1.13
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.13, timeout is 2 seconds:
. . . . .
Success rate is 0 percent (0/5)
Dallas#
Dallas#ping 192.168.0.13
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.13, timeout is 2 seconds:
11111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#
Dallas#ping 192.168.0.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.8, timeout is 2 seconds:
Reply to request 1 from 192.168.0.10, 1 ms
Reply to request 2 from 192.168.0.10, 1 ms
Reply to request 3 from 192.168.0.10, 1 ms
Reply to request 4 from 192.168.0.10, 1 ms
Dallas#
Dallas#ping 192.168.0.10
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.10, timeout is 2 seconds:
11111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Dallas(config) #router eigrp 1
Dallas(config-router)#network 192.168.0.10 255.255.255.252
Dallas(config-router)#
*Apr 5 23:08:24.735: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.10 (FastEthernet0/0) is up: new
adjacency
Dallas(config-router)#network 192.168.0.13 255.255.255.252
Dallas(config-router)#
*Apr 5 23:08:48.379: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.13 (F
astEthernet0/1) is up: new adjacency
Dallas(config-router)#network 192.168.4.4 255.255.255.255
Dallas(config-router)#no auto-summary
Dallas(config-router)#
*Apr 5 23:09:30.655: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.10 (FastEthernet0/0) is resync:
summary configured
*Apr 5 23:09:30.655: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.13 (FastEthernet0/1) is resync:
summary configured
Dallas (config-router) #exit
Dallas(config)#exit
Dallas#
*Apr 5 23:10:07.379: %SYS-5-CONFIG_I: Configured from console by console
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
       192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
       192.168.5.5 [90/156160] via 192.168.0.13, 00:01:23, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
D
       192.168.6.6 [90/158720] via 192.168.0.13, 00:01:23, FastEthernet0/1
     192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
        192.168.0.4 [90/33280] via 192.168.0.10, 00:01:24, FastEthernet0/0
D
        192.168.0.24 [90/33280] via 192.168.0.13, 00:01:24, FastEthernet0/1
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:01:24, FastEthernet0/1
D
       192.168.0.20 [90/30720] via 192.168.0.10, 00:01:24, FastEthernet0/0
D
     192.168.1.0/32 is subnetted, 1 subnets
D
        192.168.1.1 [90/161280] via 192.168.0.13, 00:01:26, FastEthernet0/1
                    [90/161280] via 192.168.0.10, 00:01:26, FastEthernet0/0
     192.168.2.0/30 is subnetted, 1 subnets
D
       192.168.2.0 [90/158720] via 192.168.0.10, 00:01:26, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
D
        192.168.3.3 [90/156160] via 192.168.0.10, 00:01:26, FastEthernet0/0
```

```
Dallas#
Dallas#show ip route 192.168.0.8
Routing entry for 192.168.0.8/30
Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
  Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/0
     Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip route 192.168.0.12
Routing entry for 192.168.0.12/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
  Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/1
      Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip route 192.168.0.20
Routing entry for 192.168.0.20/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:02:22 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:02:22 ago, via FastEthernet0/0
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip protocol
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
   192.168.0.8/30
    192.168.0.12/30
    192.168.4.4/32
  Routing Information Sources:
                                Last Update
   Gateway Distance
   192.168.0.10
                                 00:02:18
   00:02:18
90 00:02:09
192.168.0.13 90 00:02:09
istance: internal 00
  Distance: internal 90 external 170
Dallas#
Dallas#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address
                        Interface
                                            Hold Uptime SRTT
                                                                RTO Q Seq
                                            (sec)
                                                          (ms)
                                                                  Cnt Num
                                             14 00:03:08 3 200 0 25
                           Fa0/1
1
  192.168.0.13
   192.168.0.10
                           Fa0/0
                                              13 00:03:32
                                                             3 200 0 38
0
Dallas#
Dallas#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status
P 192.168.0.8/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/0
P 192.168.0.12/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/1
P 192.168.4.4/32, 1 successors, FD is 128256
        via Connected, Loopback0
P 192.168.5.5/32, 1 successors, FD is 156160
        via 192.168.0.13 (156160/128256), FastEthernet0/1
P 192.168.1.1/32, 2 successors, FD is 161280
        via 192.168.0.10 (161280/158720), FastEthernet0/0
        via 192.168.0.13 (161280/158720), FastEthernet0/1
P 192.168.6.6/32, 1 successors, FD is 158720
        via 192.168.0.13 (158720/156160), FastEthernet0/1
P 192.168.3.3/32, 1 successors, FD is 156160
        via 192.168.0.10 (156160/128256), FastEthernet0/0
```

```
P 192.168.2.0/30, 1 successors, FD is 158720
        via 192.168.0.10 (158720/156160), FastEthernet0/0
P 192.168.0.4/30, 1 successors, FD is 33280
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status
        via 192.168.0.10 (33280/30720), FastEthernet0/0
P 192.168.0.24/30, 1 successors, FD is 33280
        via 192.168.0.13 (33280/30720), FastEthernet0/1
P 192.168.0.16/30, 1 successors, FD is 30720
        via 192.168.0.13 (30720/28160), FastEthernet0/1
P 192.168.0.20/30, 1 successors, FD is 30720
       via 192.168.0.10 (30720/28160), FastEthernet0/0
Dallas#
Dallas#show ip eigrp topology 192.168.0.8/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.8/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 0
Dallas#
Dallas#show ip eigrp topology 192.168.0.20/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.20/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.4/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 2
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
```

```
Composite metric is (35840/33280), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 4 msec 0 msec 0 msec
  2 192.168.0.17 4 msec * 0 msec
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:07:47, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
        192.168.6.6 [90/158720] via 192.168.0.13, 00:07:47, FastEthernet0/1
D
     192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:07:48, FastEthernet0/0
        192.168.0.24 [90/33280] via 192.168.0.13, 00:07:48, FastEthernet0/1
D
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:07:48, FastEthernet0/1
        192.168.0.20 [90/30720] via 192.168.0.10, 00:07:48, FastEthernet0/0
D
     192.168.1.0/32 is subnetted, 1 subnets
D
        192.168.1.1 [90/161280] via 192.168.0.13, 00:07:49, FastEthernet0/1
                     [90/161280] via 192.168.0.10, 00:07:49, FastEthernet0/0
     192.168.2.0/30 is subnetted, 1 subnets
D
        192.168.2.0 [90/158720] via 192.168.0.10, 00:07:49, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
        192.168.3.3 [90/156160] via 192.168.0.10, 00:07:49, FastEthernet0/0
D
Dallas#
Dallas########## error on seattle's loopback?
Dallas########## wrong subnet mask and wrong loopback IP for Atlanta
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
С
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:13:25, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
D
        192.168.6.6 [90/158720] via 192.168.0.13, 00:13:25, FastEthernet0/1
     192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:13:26, FastEthernet0/0
        192.168.0.24 [90/33280] via 192.168.0.13, 00:13:26, FastEthernet0/1
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:13:26, FastEthernet0/1 192.168.0.20 [90/30720] via 192.168.0.10, 00:13:26, FastEthernet0/0
D
D
     192.168.1.0/32 is subnetted, 1 subnets
D
        192.168.1.1 [90/161280] via 192.168.0.13, 00:13:27, FastEthernet0/1
                     [90/161280] via 192.168.0.10, 00:13:27, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
        192.168.2.2 [90/158720] via 192.168.0.10, 00:02:36, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
        192.168.3.3 [90/156160] via 192.168.0.10, 00:13:27, FastEthernet0/0
Dallas#
```

```
Dallas########## error fixed. Seattle back to 192.168.2.2 with correct subnet
Dallas#
Dallas#show ip route 192.168.0.8
Routing entry for 192.168.0.8/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
  Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/0
     Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip route 192.168.0.20
Routing entry for 192.168.0.20/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:14:17 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:14:17 ago, via FastEthernet0/0
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip route 192.168.0.4
Routing entry for 192.168.0.4/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:14:23 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:14:23 ago, via FastEthernet0/0
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.24
Routing entry for 192.168.0.24/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:14:29 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:14:29 ago, via FastEthernet0/1
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.16
Routing entry for 192.168.0.16/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:14:35 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:14:35 ago, via FastEthernet0/1
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip protocol
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    192.168.0.8/30
    192.168.0.12/30
   192.168.4.4/32
  Routing Information Sources:
   Gateway
                   Distance
                                 Last Update
                    90
    (this router)
                                 00:14:13
    192.168.0.10
                         90
                                  00:03:54
```

192.168.0.13 90 00:03:54 Distance: internal 90 external 170 Dallas# Dallas#show ip eigrp neighbors IP-EIGRP neighbors for process 1 H Address Interface Hold Uptime SRTT RTO Q Seq (sec) (ms) Cnt Num 12 00:15:13 4 200 0 31 1 192.168.0.13 Fa0/1 0 192.168.0.10 Fa0/0 14 00:15:36 1 200 0 43 Dallas# Dallas#show ip eigrp topology IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4) Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply, r - reply Status, s - sia Status P 192.168.0.8/30, 1 successors, FD is 28160 via Connected, FastEthernet0/0 P 192.168.0.12/30, 1 successors, FD is 28160 via Connected, FastEthernet0/1 P 192.168.2.2/32, 1 successors, FD is 158720 via 192.168.0.10 (158720/156160), FastEthernet0/0 P 192.168.4.4/32, 1 successors, FD is 128256 via Connected, Loopback0 P 192.168.5.5/32, 1 successors, FD is 156160 via 192.168.0.13 (156160/128256), FastEthernet0/1 P 192.168.1.1/32, 2 successors, FD is 161280 via 192.168.0.10 (161280/158720), FastEthernet0/0 via 192.168.0.13 (161280/158720), FastEthernet0/1 P 192.168.6.6/32, 1 successors, FD is 158720 via 192.168.0.13 (158720/156160), FastEthernet0/1 P 192.168.3.3/32, 1 successors, FD is 156160 via 192.168.0.10 (156160/128256), FastEthernet0/0 P 192.168.0.4/30, 1 successors, FD is 33280 Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply, r - reply Status, s - sia Status via 192.168.0.10 (33280/30720), FastEthernet0/0 P 192.168.0.24/30, 1 successors, FD is 33280 via 192.168.0.13 (33280/30720), FastEthernet0/1 P 192.168.0.16/30, 1 successors, FD is 30720 via 192.168.0.13 (30720/28160), FastEthernet0/1 P 192.168.0.20/30, 1 successors, FD is 30720 via 192.168.0.10 (30720/28160), FastEthernet0/0 Dallas# Dallas## Passive means that... Dallas## there is no traffic passing. It has already converged Dallas# Dallas#show ip eigrp topology 192.168.0.8/30 IP-EIGRP (AS 1): Topology entry for 192.168.0.8/30 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160 Routing Descriptor Blocks: 0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0 Composite metric is (28160/0), Route is Internal Vector metric: Minimum bandwidth is 100000 Kbit Total delay is 100 microseconds Reliability is 255/255 Load is 1/255 Minimum MTU is 1500 Hop count is 0 Dallas# Dallas#show ip eigrp topology 192.168.0.20/30 IP-EIGRP (AS 1): Topology entry for 192.168.0.20/30 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720 Routing Descriptor Blocks: 192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0 Composite metric is (30720/28160), Route is Internal Vector metric: Minimum bandwidth is 100000 Kbit Total delay is 200 microseconds Reliability is 255/255 Load is 1/255 Minimum MTU is 1500 Hop count is 1 Dallas# Dallas#show ip eigrp topology 192.168.0.4/30 IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280 Routing Descriptor Blocks: 192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0

```
Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
       Load is 1/255
        Minimum MTU is 1500
       Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
       Load is 1/255
        Minimum MTU is 1500
       Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.16/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.16/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
       Reliability is 255/255
       Load is 1/255
       Minimum MTU is 1500
       Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.12/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.12/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/1), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
       Hop count is 0
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 4 msec 0 msec 0 msec
  2 192.168.0.17 4 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.0.17
Type escape sequence to abort.
Tracing the route to 192.168.0.17
 1 192.168.0.13 0 msec 0 msec 4 msec
```

```
2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.0.6
Type escape sequence to abort.
Tracing the route to 192.168.0.6
  1 192.168.0.10 0 msec 4 msec 0 msec
  2 192.168.0.21 0 msec 0 msec 0 msec
  3 192.168.0.6 4 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.1.1
Type escape sequence to abort.
Tracing the route to 192.168.1.1
  1 192.168.0.10 4 msec
    192.168.0.13 0 msec
    192.168.0.10 0 msec
  2 192.168.0.17 4 msec
    192.168.0.21 0 msec
    192.168.0.17 4 msec
  3 192.168.0.6 0 msec
    192.168.0.25 0 msec *
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 0 msec
  2 192.168.0.17 4 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 4 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas########### 4.1
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
        192.168.4.4 is directly connected, Loopback0
C
     192.168.5.0/32 is subnetted, 1 subnets
       192.168.5.5 [90/156160] via 192.168.0.13, 00:25:53, FastEthernet0/1
D
     192.168.6.0/32 is subnetted, 1 subnets
        192.168.6.6 [90/158720] via 192.168.0.13, 00:25:53, FastEthernet0/1
D
     192.168.0.0/30 is subnetted, 6 subnets
С
       192.168.0.8 is directly connected, FastEthernet0/0
        192.168.0.12 is directly connected, FastEthernet0/1
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:25:54, FastEthernet0/0
        192.168.0.24 [90/33280] via 192.168.0.13, 00:25:54, FastEthernet0/1
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:25:54, FastEthernet0/1
D
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:25:54, FastEthernet0/0
     192.168.1.0/32 is subnetted, 1 subnets
       192.168.1.1 [90/161280] via 192.168.0.13, 00:25:56, FastEthernet0/1
D
                    [90/161280] via 192.168.0.10, 00:25:56, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
       192.168.2.2 [90/158720] via 192.168.0.10, 00:15:05, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
        192.168.3.3 [90/156160] via 192.168.0.10, 00:25:56, FastEthernet0/0
D
Dallas#
Dallas#### # of entries = C-3x, D(EIGRP)-9x
Dallas## how has the table changed?
Dallas## 4.2 Who are the eigrp neighbors?
Dallas#
Dallas#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
                                                                 RTO Q Seq
н
  Address
                            Interface
                                            Hold Uptime
                                                          SRTT
                                            (sec)
                                                          (ms)
                                                                    Cnt Num
                                              10 00:27:47
                                                                 200 0 31
1
    192.168.0.13
                            Fa0/1
                                                            4
0
    192.168.0.10
                            Fa0/0
                                              14 00:28:11
                                                             1
                                                                 200 0 43
Dallas#
Dallas## 4.3 take an entry from the topology table and deciper each part
Dallas#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
```

```
r - reply Status, s - sia Status
P 192.168.0.8/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/0
P 192.168.0.12/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/1
P 192.168.2.2/32, 1 successors, FD is 158720
        via 192.168.0.10 (158720/156160), FastEthernet0/0
P 192.168.4.4/32, 1 successors, FD is 128256
        via Connected, Loopback0
P 192.168.5.5/32, 1 successors, FD is 156160
        via 192.168.0.13 (156160/128256), FastEthernet0/1
P 192.168.1.1/32, 2 successors, FD is 161280
        via 192.168.0.10 (161280/158720), FastEthernet0/0
        via 192.168.0.13 (161280/158720), FastEthernet0/1
P 192.168.6.6/32, 1 successors, FD is 158720
        via 192.168.0.13 (158720/156160), FastEthernet0/1
P 192.168.3.3/32, 1 successors, FD is 156160
        via 192.168.0.10 (156160/128256), FastEthernet0/0
P 192.168.0.4/30, 1 successors, FD is 33280
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status
        via 192.168.0.10 (33280/30720), FastEthernet0/0
P 192.168.0.24/30, 1 successors, FD is 33280
        via 192.168.0.13 (33280/30720), FastEthernet0/1
P 192.168.0.16/30, 1 successors, FD is 30720
        via 192.168.0.13 (30720/28160), FastEthernet0/1
P 192.168.0.20/30, 1 successors, FD is 30720
        via 192.168.0.10 (30720/28160), FastEthernet0/0
Dallas#
Dallas## P-passive
Dallas#
Dallas## 1 successors = how many ways to get to the destination?
Dallas#
Dallas## Moving on to section 5
Dallas#
Dallas###### 5. Turn up on additional link
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
С
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
       192.168.5.5 [90/156160] via 192.168.0.13, 00:32:36, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
        192.168.6.6 [90/158720] via 192.168.0.13, 00:32:36, FastEthernet0/1
D
     192.168.0.0/30 is subnetted, 6 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:32:38, FastEthernet0/0
        192.168.0.24 [90/33280] via 192.168.0.13, 00:32:38, FastEthernet0/1
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:32:38, FastEthernet0/1
D
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:32:38, FastEthernet0/0
     192.168.1.0/32 is subnetted, 1 subnets
D
        192.168.1.1 [90/161280] via 192.168.0.13, 00:32:39, FastEthernet0/1
                    [90/161280] via 192.168.0.10, 00:32:39, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
       192.168.2.2 [90/158720] via 192.168.0.10, 00:21:47, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
        192.168.3.3 [90/156160] via 192.168.0.10, 00:32:39, FastEthernet0/0
D
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
С
       192.168.4.4 is directly connected, Loopback0
```

```
192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:35:24, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
D
        192.168.6.6 [90/158720] via 192.168.0.13, 00:35:24, FastEthernet0/1
     192.168.0.0/30 is subnetted, 7 subnets
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
D
        192.168.0.4 [90/33280] via 192.168.0.10, 00:35:25, FastEthernet0/0
D
        192.168.0.24 [90/33280] via 192.168.0.13, 00:35:25, FastEthernet0/1
        192.168.0.28 [90/20514560] via 192.168.0.10, 00:00:11, FastEthernet0/0
D
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:35:25, FastEthernet0/1
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:35:26, FastEthernet0/0
     192.168.1.0/32 is subnetted, 1 subnets
        192.168.1.1 [90/161280] via 192.168.0.13, 00:35:28, FastEthernet0/1
D
                    [90/161280] via 192.168.0.10, 00:35:28, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
        192.168.2.2 [90/158720] via 192.168.0.10, 00:24:36, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
D
        192.168.3.3 [90/156160] via 192.168.0.10, 00:35:28, FastEthernet0/0
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 0 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#ping 192.168.0.16
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.16, timeout is 2 seconds:
1111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#
Dallas#ping 192.168.0.28
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.28, timeout is 2 seconds:
11111
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Dallas#
Dallas#traceroute 192.168.6.6
Type escape sequence to abort.
Tracing the route to 192.168.6.6
  1 192.168.0.13 0 msec 0 msec 4 msec
  2 192.168.0.17 0 msec * 0 msec
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
        192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:41:13, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
D
        192.168.6.6 [90/158720] via 192.168.0.13, 00:41:13, FastEthernet0/1
     192.168.0.0/30 is subnetted, 7 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
С
        192.168.0.12 is directly connected, FastEthernet0/1
        192.168.0.4 [90/33280] via 192.168.0.10, 00:41:14, FastEthernet0/0
D
        192.168.0.24 [90/33280] via 192.168.0.13, 00:41:14, FastEthernet0/1
D
D
        192.168.0.28 [90/20514560] via 192.168.0.10, 00:05:59, FastEthernet0/0
D
        192.168.0.16 [90/30720] via 192.168.0.13, 00:41:14, FastEthernet0/1
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:41:15, FastEthernet0/0
     192.168.1.0/32 is subnetted, 1 subnets
        192.168.1.1 [90/161280] via 192.168.0.13, 00:41:15, FastEthernet0/1
D
                    [90/161280] via 192.168.0.10, 00:41:15, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
        192.168.2.2 [90/158720] via 192.168.0.10, 00:30:24, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
```

```
D
        192.168.3.3 [90/156160] via 192.168.0.10, 00:41:15, FastEthernet0/0
Dallas#
Dallas## Note on the 192.168.0.28, the metric is huge:
Dallas## metric = 20514560
Dallas#
Dallas## Metic - the lower the better
Dallas#
Dallas#$traceroute is done, it won't send through the serial link as the
Dallas## link has a huge metric value.
Dallas## metric is very big as the serial link has a small bandwidth
Dallas#
Dallas#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
     192.168.4.0/32 is subnetted, 1 subnets
C
       192.168.4.4 is directly connected, Loopback0
     192.168.5.0/32 is subnetted, 1 subnets
D
        192.168.5.5 [90/156160] via 192.168.0.13, 00:48:45, FastEthernet0/1
     192.168.6.0/32 is subnetted, 1 subnets
        192.168.6.6 [90/158720] via 192.168.0.13, 00:48:45, FastEthernet0/1
D
     192.168.0.0/30 is subnetted, 7 subnets
С
        192.168.0.8 is directly connected, FastEthernet0/0
        192.168.0.12 is directly connected, FastEthernet0/1
        192.168.0.4 [90/33280] via 192.168.0.10, 00:48:46, FastEthernet0/0
D
        192.168.0.24 [90/33280] via 192.168.0.13, 00:48:46, FastEthernet0/1
D
D
        192.168.0.28 [90/20514560] via 192.168.0.10, 00:13:31, FastEthernet0/0
        192.168.0.16 [90/30720] via 192.168.0.13, 00:48:46, FastEthernet0/1
D
D
        192.168.0.20 [90/30720] via 192.168.0.10, 00:48:47, FastEthernet0/0
     192.168.1.0/32 is subnetted, 1 subnets
        192.168.1.1 [90/161280] via 192.168.0.13, 00:48:47, FastEthernet0/1
D
                    [90/161280] via 192.168.0.10, 00:48:47, FastEthernet0/0
     192.168.2.0/32 is subnetted, 1 subnets
D
        192.168.2.2 [90/158720] via 192.168.0.10, 00:37:55, FastEthernet0/0
     192.168.3.0/32 is subnetted, 1 subnets
D
        192.168.3.3 [90/156160] via 192.168.0.10, 00:48:47, FastEthernet0/0
Dallas#
Dallas#show ip route 192.168.0.8
Routing entry for 192.168.0.8/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
  Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/0
     Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip route 192.168.0.20
Routing entry for 192.168.0.20/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:49:10 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:49:10 ago, via FastEthernet0/0
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip route 192.168.0.24
Routing entry for 192.168.0.24/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:49:16 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:49:16 ago, via FastEthernet0/1
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.4
Routing entry for 192.168.0.4/30
  Known via "eigrp 1", distance 90, metric 33280, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:49:25 ago
```

```
Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:49:25 ago, via FastEthernet0/0
      Route metric is 33280, traffic share count is 1
      Total delay is 300 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 2
Dallas#
Dallas#show ip route 192.168.0.28
Routing entry for 192.168.0.28/30
  Known via "eigrp 1", distance 90, metric 20514560, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.10 on FastEthernet0/0, 00:14:15 ago
  Routing Descriptor Blocks:
  * 192.168.0.10, from 192.168.0.10, 00:14:15 ago, via FastEthernet0/0
      Route metric is 20514560, traffic share count is 1
      Total delay is 20100 microseconds, minimum bandwidth is 128 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip route 192.168.0.16
Routing entry for 192.168.0.16/30
  Known via "eigrp 1", distance 90, metric 30720, type internal
  Redistributing via eigrp 1
  Last update from 192.168.0.13 on FastEthernet0/1, 00:49:35 ago
  Routing Descriptor Blocks:
  * 192.168.0.13, from 192.168.0.13, 00:49:35 ago, via FastEthernet0/1
      Route metric is 30720, traffic share count is 1
      Total delay is 200 microseconds, minimum bandwidth is 100000 Kbit
      Reliability 255/255, minimum MTU 1500 bytes
      Loading 1/255, Hops 1
Dallas#
Dallas#show ip route 192.168.0.12
Routing entry for 192.168.0.12/30
  Known via "connected", distance 0, metric 0 (connected, via interface)
  Redistributing via eigrp 1
  Routing Descriptor Blocks:
  * directly connected, via FastEthernet0/1
      Route metric is 0, traffic share count is 1
Dallas#
Dallas#show ip protocols
Routing Protocol is "eigrp 1"
  Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Redistributing: eigrp 1
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
   192.168.0.8/30
    192.168.0.12/30
    192.168.4.4/32
  Routing Information Sources:
   Gateway Distance
                                 Last Update
                     90
                                 00:49:24
    (this router)
    192.168.0.10
                          90
                                  00:14:43
   192.168.0.13
                         90
                                 00:14:43
  Distance: internal 90 external 170
Dallas#
Dallas#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address
                           Interface
                                            Hold Uptime SRTT
                                                                RTO Q Seq
                                            (sec)
                                                          (ms)
                                                                  Cnt Num
                                             (ms) Cnt Nur
13 00:50:08 2 200 0 32
1
   192.168.0.13
                           Fa0/1
                                             11 00:50:32 1 200 0 49
0
  192.168.0.10
                           Fa0/0
Dallas#
Dallas#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(192.168.4.4)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status
P 192.168.0.8/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/0
P 192.168.0.12/30, 1 successors, FD is 28160
        via Connected, FastEthernet0/1
P 192.168.2.2/32, 1 successors, FD is 158720
```

```
via 192.168.0.10 (158720/156160), FastEthernet0/0
P 192.168.4.4/32, 1 successors, FD is 128256
        via Connected, Loopback0
P 192.168.5.5/32, 1 successors, FD is 156160
        via 192.168.0.13 (156160/128256), FastEthernet0/1
P 192.168.1.1/32, 2 successors, FD is 161280
        via 192.168.0.10 (161280/158720), FastEthernet0/0
        via 192.168.0.13 (161280/158720), FastEthernet0/1
P 192.168.6.6/32, 1 successors, FD is 158720
        via 192.168.0.13 (158720/156160), FastEthernet0/1
P 192.168.3.3/32, 1 successors, FD is 156160
        via 192.168.0.10 (156160/128256), FastEthernet0/0
P 192.168.0.4/30, 1 successors, FD is 33280
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status
       via 192.168.0.10 (33280/30720), FastEthernet0/0
P 192.168.0.24/30, 1 successors, FD is 33280
        via 192.168.0.13 (33280/30720), FastEthernet0/1
P 192.168.0.28/30, 1 successors, FD is 20514560
        via 192.168.0.10 (20514560/20512000), FastEthernet0/0
P 192.168.0.16/30, 1 successors, FD is 30720
        via 192.168.0.13 (30720/28160), FastEthernet0/1
P 192.168.0.20/30, 1 successors, FD is 30720
        via 192.168.0.10 (30720/28160), FastEthernet0/0
Dallas#
Dallas#show ip eigrp topology 192.168.0.8/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.8/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 0
Dallas#
Dallas#show ip eigrp topology 192.168.0.20/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.20/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
        Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
       Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.4/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.4/30
```

```
State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
       Hop count is 2
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.24/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.24/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 33280
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (33280/30720), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 300 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
       Hop count is 2
  192.168.0.10 (FastEthernet0/0), from 192.168.0.10, Send flag is 0x0
      Composite metric is (35840/33280), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 400 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 3
Dallas#
Dallas#show ip eigrp topology 192.168.0.16/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.16/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 30720
  Routing Descriptor Blocks:
  192.168.0.13 (FastEthernet0/1), from 192.168.0.13, Send flag is 0x0
      Composite metric is (30720/28160), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 200 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 1
Dallas#
Dallas#show ip eigrp topology 192.168.0.12/30
IP-EIGRP (AS 1): Topology entry for 192.168.0.12/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/1), from Connected, Send flag is 0{\rm x}0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
       Minimum bandwidth is 100000 Kbit
        Total delay is 100 microseconds
        Reliability is 255/255
        Load is 1/255
        Minimum MTU is 1500
        Hop count is 0
Dallas#
Dallas#show ip eigrp topology 192.168.0.12 255.255.255.252
IP-EIGRP (AS 1): Topology entry for 192.168.0.12/30
  State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160
  Routing Descriptor Blocks:
  0.0.0.0 (FastEthernet0/1), from Connected, Send flag is 0x0
      Composite metric is (28160/0), Route is Internal
      Vector metric:
```

Minimum bandwidth is 100000 Kbit Total delay is 100 microseconds Reliability is 255/255 Load is 1/255 Minimum MTU is 1500 Hop count is 0 Dallas# Dallas## tested another method of subnet masking Dallas# *Apr 6 00:01:43.511: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern et0/0, changed state to down *Apr 6 00:01:43.519: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.10 (F astEthernet0/0) is down: interface down Dallas# *Apr 6 00:02:44.151: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern et0/1, changed state to down *Apr 6 00:02:44.159: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 1: Neighbor 192.168.0.13 (F astEthernet0/1) is down: interface down