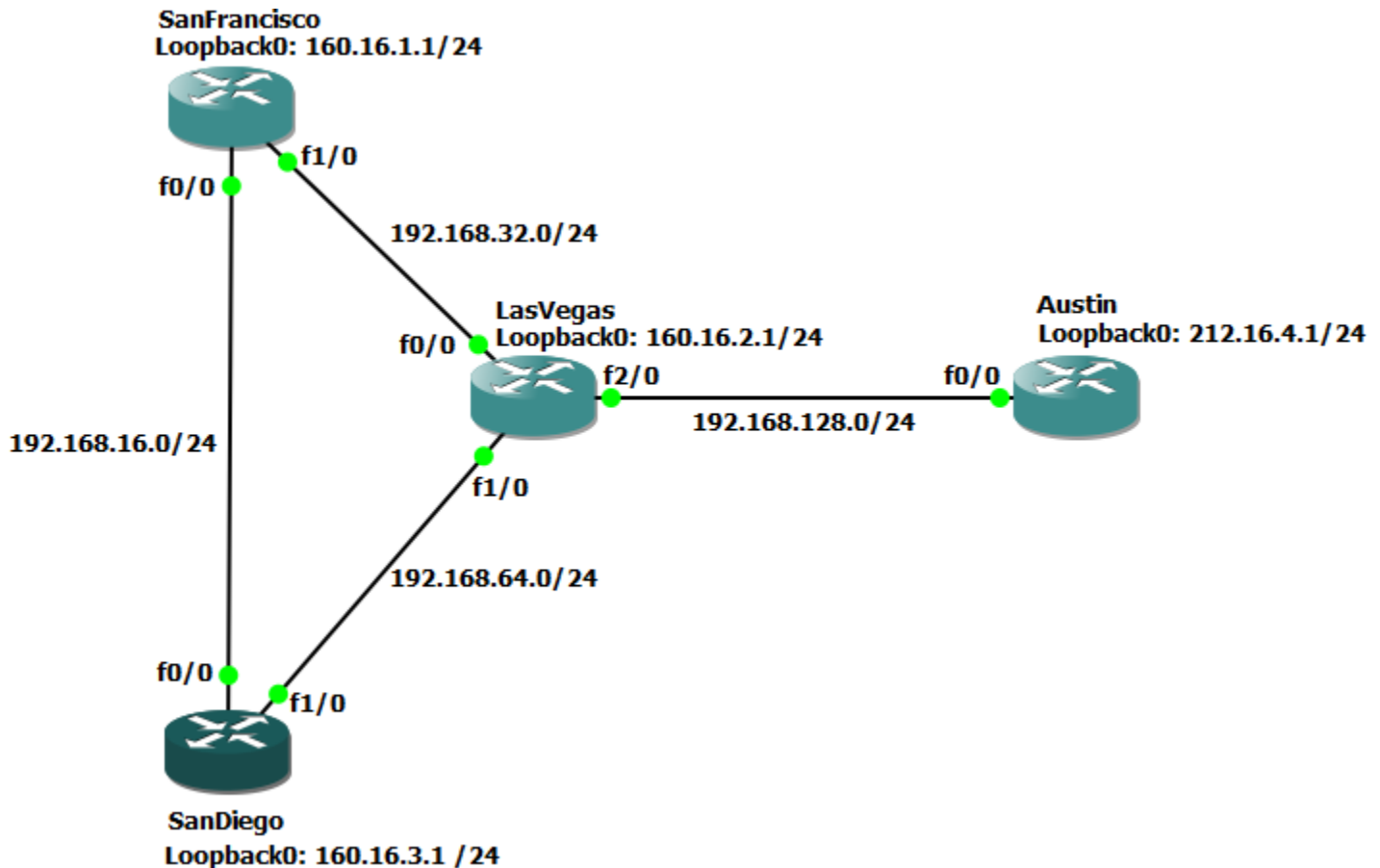


# 1 EIGRP – Second Part: Overview and Network Topology

To be able to do this study, you should first complete [the first part of EIGRP configuration](#). Briefly, this lab study is written based on the assumption that

- You have configured all the interfaces on each of the four routers
- You have configured EIGRP routing protocol for all routers.



## SanFrancisco

- f0/0 192.168.16.1/24
- f1/0 192.168.32.1/24

## SanDiego

- f0/0 192.168.16.2/24
- f1/0 192.168.64.2/24

## LasVegas

- f0/0 192.168.32.3/24
- f1/0 192.168.64.3/24
- f2/0 192.168.128.3/24

## Austin

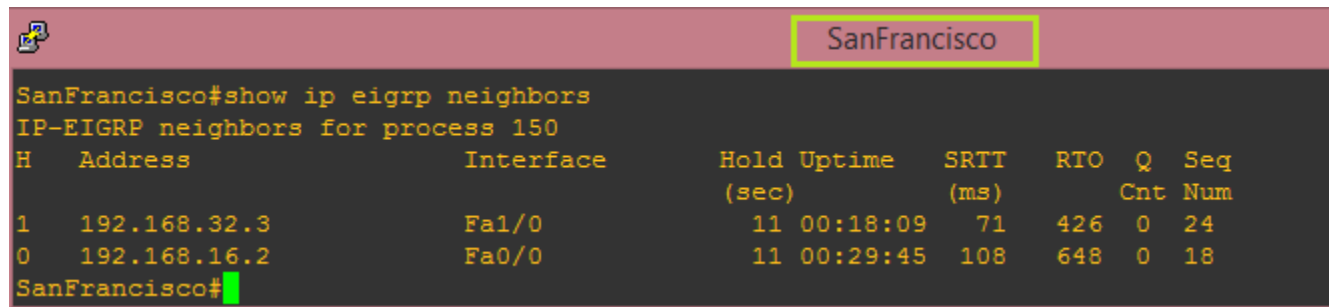
- f0/0 192.168.128.4/24

## Interface IP Address List

## 2 Configuring Routes with EIGRP

To display the neighbors discovered by Enhanced Interior Gateway Routing Protocol (EIGRP), we use the **show ip eigrp neighbors** command in EXEC mode.

```
SanFrancisco#show ip eigrp neighbors
```



```
SanFrancisco#show ip eigrp neighbors
IP-EIGRP neighbors for process 150
H   Address                Interface      Hold Uptime    SRTT   RTO  Q  Seq
                               (sec)          (ms)        Cnt  Num
1   192.168.32.3            Fa1/0          11 00:18:09    71    426  0   24
0   192.168.16.2            Fa0/0          11 00:29:45   108    648  0   18
SanFrancisco#
```

Namely, the Router **SanFrancisco** has 2 neighbors:

- At f1/0, 192.168.32.3 (LasVegas)
- At f0/0, 192.168.16.2 (SanDiego)

Please note that these are the neighbors we expected to see based on the given topology and Interface IP Address List above. Using this command, you can **verify if you have configured the EIGRP properly at the first part**. If the output of the **show ip eigrp neighbors** command for each router does not match the given Interface IP List, please repeat the steps in the previous lab study and make sure everything is configured properly.



Please take screen shot of the ENTIRE SCREEN for the Routers **SanFrancisco**, **SanDiego**, **LasVegas**, and **Austin**; where we can see the result of the **show ip eigrp neighbors** Command. Please **DO NOT MAXIMIZE** the console screen and allow your background to be seen in the image. **Otherwise, your grade for this image will be zero. The file name must be as follows; otherwise, your grade for this image will be zero.**

```
EiNg.SF.FirstName.LastName.png
EiNg.SD.FirstName.LastName.png
EiNg.LV.FirstName.LastName.png
EiNg.Au.FirstName.LastName.png
```

## 3 Testing Full EIGRP Connectivity

Please test if the Router **SanFrancisco** is able to ping the **loopbacks** of all other routers. For example, this is how the Router SanFrancisco pings the loopback of the Router **SanDiego**.

SanFrancisco#ping 160.16.3.1



Please take screen shot of the ENTIRE SCREEN for the router [SanFrancisco](#); where we can see the result of the 3 ping commands. Please **DO NOT MAXIMIZE** the console screen and allow your background to be seen in the image. **Otherwise, your grade for this image will be zero. The file name must be as follows; otherwise, your grade for this image will be zero**

**P3LB.SF.FirstName.LastName.png**

What other routers can the router [SanFrancisco](#) ping? Please describe why? You can use the **show ip route** (sh ip route) command to display the routes configured on the Router [SanFrancisco](#).

---

On all the routers, please use the **no auto-summary** command as shown below. Here is the example for the Router [SanFrancisco](#).

```
SanFrancisco#enable
SanFrancisco#configure terminal
SanFrancisco(config)#router eigrp 150
SanFrancisco(config-router)#no auto-summary
SanFrancisco(config-router)#end
```

After all the routers are configured to be no auto-summary, please test if the Router [SanFrancisco](#) is now able to ping the **loopbacks** of all other routers.

Please take screen shot of the ENTIRE SCREEN for the router [SanFrancisco](#); where we can see the result of the 3 ping commands. Please **DO NOT MAXIMIZE** the console screen and allow your background to be seen in the image. **Otherwise, your grade for this image will be zero. The file name must be as follows; otherwise, your grade for this image will be zero**

**P3NA.SF.FirstName.LastName.png**

## 4 Enforcing a Route Change

Let us find out how the Router [SanFrancisco](#) communicates with the router [SanDiego](#); namely, which route:

- Direct Link, or
- Via LasVegas

is used by the Router [SanFrancisco](#).

Use the command **show ip route** on the Router **SanFrancisco**

```
SanFrancisco
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 60/61/64 ms
SanFrancisco#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

D    192.168.128.0/24 [90/30720] via 192.168.32.3, 00:07:13, FastEthernet1/0
D    192.168.64.0/24 [90/30720] via 192.168.32.3, 00:07:13, FastEthernet1/0
      [90/30720] via 192.168.16.2, 00:07:13, FastEthernet0/0
      160.16.0.0/24 is subnetted, 3 subnets
C      160.16.1.0 is directly connected, Loopback0
D      160.16.2.0 [90/156160] via 192.168.32.3, 00:00:51, FastEthernet1/0
D      160.16.3.0 [90/156160] via 192.168.16.2, 00:00:51, FastEthernet0/0
D      212.16.4.0/24 [90/158720] via 192.168.32.3, 00:07:15, FastEthernet1/0
C      192.168.16.0/24 is directly connected, FastEthernet0/0
C      192.168.32.0/24 is directly connected, FastEthernet1/0
SanFrancisco#
```

As we expected, the Router **SanFrancisco** communicates with the router **SanDiego** (160.16.3.0 the loopback) through the direct link (**FastEthernet0/0**), which is the shortest link.

Can we enforce the Router **SanFrancisco** to use the other route, via the **Router LasVegas**? If the route via the **Router LasVegas** becomes faster than the direct link, the Router **SanFrancisco** will start using it. Let's check the current bandwidth of the direct link as shown below:

**SanFrancisco#show interface**

```
SanFrancisco
SanFrancisco(config)#end
SanFrancisco#show
*Mar  1 12:47:41.120: %SYS-5-CONFIG_I: Configured from console by console
SanFrancisco#show interface
FastEthernet0/0 is up, line protocol is up
  Hardware is AmdFE, address is cc01.273c.0000 (bia cc01.273c.0000)
  Internet address is 192.168.16.1/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
```

The bandwidth is 100,000 Kbit. You can actually change the bandwidth value. So, if you make the bandwidth of the interface 0/0 low enough, the Router **SanFrancisco** will start using the Router **LasVegas** in order to

communicate with **SanDiego**. To set the inherited and received bandwidth values for an interface, you can use the **bandwidth** command. Informational bandwidth in kilobits per second. Valid values are from 1 to 10,000,000.

```
SanFrancisco#enable
SanFrancisco#configure terminal
SanFrancisco(config)#interface fastethernet 0/0
SanFrancisco(config-if)#bandwidth 50000
```

where **50000** is the new bandwidth. Please change the bandwidth of interface fastethernet 0/0 of the Router **SanFrancisco** using the commands given above. Then, use the command **show ip route** to see how the Router **SanFrancisco** now communicates with **SanDiego**. Please remember that you can use the command **show interface** to make sure that you could properly update the bandwidth. Please note that when the direct path becomes slower, the router may use a longer but faster path.



Please take screen shot of the ENTIRE SCREEN for the router **SanFrancisco**; where we can see the result of the command **show ip route** after the bandwidth update. Please **DO NOT MAXIMIZE** the console screen and allow your background to be seen in the image. **Otherwise, your grade for this image will be zero.** **The file name must be as follows; otherwise, your grade for this image will be zero**

**ShIR.SF.FirstName.LastName**.png

## 5 Grading

Please make the console screen large but **DO NOT MAXIMIZE** it and allow your background to be seen in the screenshot. **Otherwise, your grade for the image will be zero.**

**The file name must be as follows; otherwise, your grade for the image will be zero.**

<b>EiNg.SF.FirstName.LastName</b> .png	5 points
<b>EiNg.SD.FirstName.LastName</b> .png	5 points
<b>EiNg.LV.FirstName.LastName</b> .png	5 points
<b>EiNg.Au.FirstName.LastName</b> .png	5 points
<b>P3LB.SF.FirstName.LastName</b> .png	20 points
What other routers can the router <b>SanFrancisco</b> ping? Please describe why?	20 points
<b>P3NA.SF.FirstName.LastName</b> .png	20 points
<b>ShIR.SF.FirstName.LastName</b> .png	20 points

## 6 References

- [1] A Practical Guide to Advanced Networking, 3rd Edition, Jeffrey S. Beasley and Piyasat Nilkaew, Pearson, 2012, CourseSmart
- [2] <http://www.cisco.com/c/en/us/support/docs/ip/enhanced-interior-gateway-routing-protocol-eigrp/16406-eigrp-toc.html>
- [3] [http://www.cisco.com/c/en/us/td/docs/security/asa/asa82/configuration/guide/config/route\\_eigrp.html](http://www.cisco.com/c/en/us/td/docs/security/asa/asa82/configuration/guide/config/route_eigrp.html)
- [4] [http://www.cisco.com/c/en/us/td/docs/ios/12\\_2/iproute/command/reference/fiprrp\\_r/1rfeigrp.html](http://www.cisco.com/c/en/us/td/docs/ios/12_2/iproute/command/reference/fiprrp_r/1rfeigrp.html)
- [5] [http://www.cisco.com/web/techdoc/dc/reference/cli/nxos/commands/12/bandwidth\\_interface.html](http://www.cisco.com/web/techdoc/dc/reference/cli/nxos/commands/12/bandwidth_interface.html)

