

1 Overview: EIGRP – Enhanced Dynamic Routing

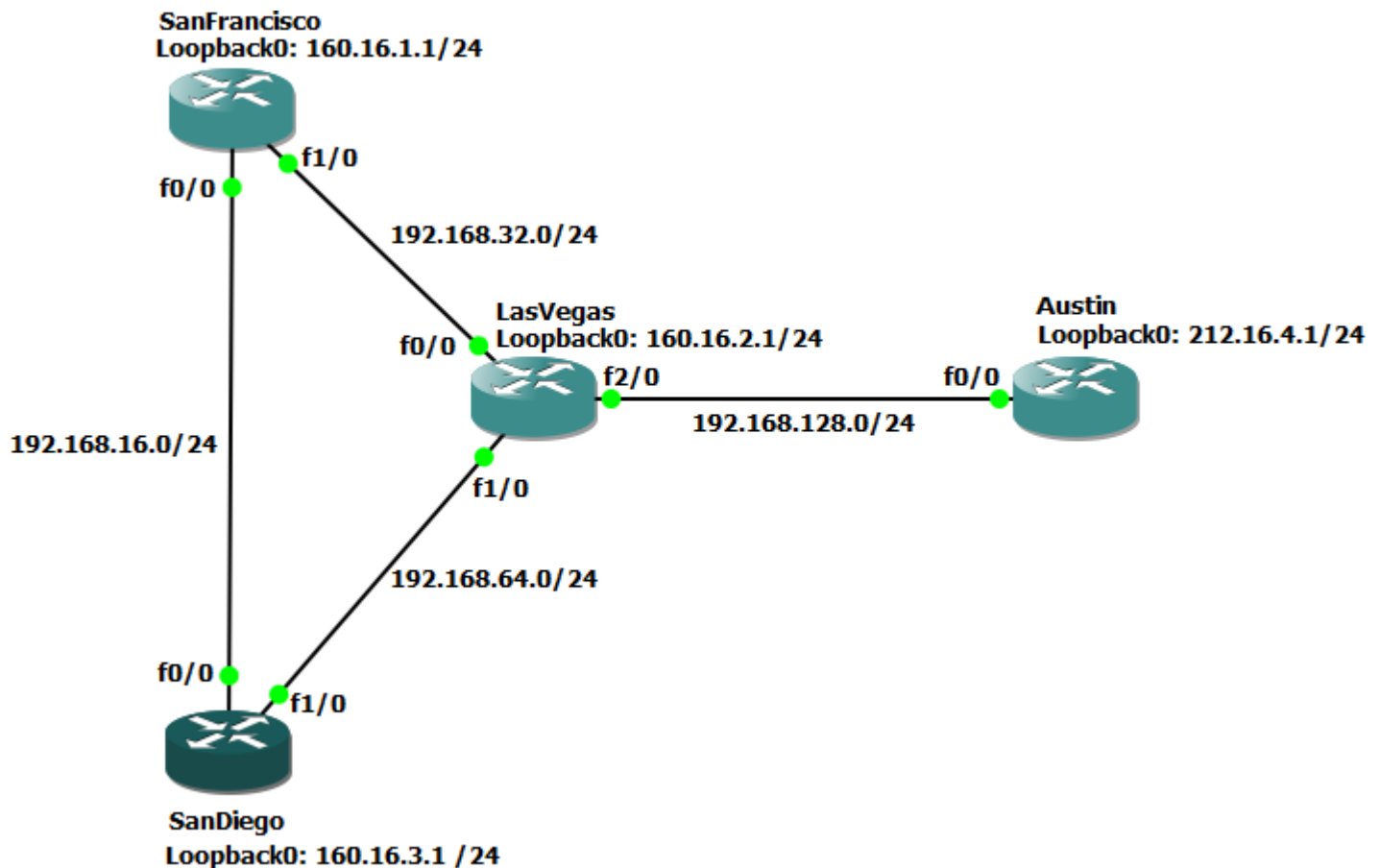
This lab examines an [advanced dynamic routing protocol](#), Enhanced Interior Gateway Routing Protocol (EIGRP). EIGRP is a Cisco proprietary protocol and is often called a hybrid routing protocol that incorporates the best of the distance vector and link-state algorithms. Some of the many advantages of EIGRP are:

- Very low usage of network resources during normal operation; only hello packets are transmitted on a stable network
- When a change occurs, only routing table changes are propagated, not the entire routing table; this reduces the load the routing protocol itself places on the network
- Rapid convergence times for changes in the network topology (in some situations convergence can be almost instantaneous)

EIGRP [allows the use of variable length subnet masks](#), which is beneficial when you're trying to conserve the use of IP addresses. The routing table updates are exchanged when there is a change in the network. In other words, the routers don't exchange unnecessary information unless a route changes. This helps conserve the limited bandwidth of the network data link.

2 Network Topology

You will use the image file [c3640-jk9s-mz.124-16.bin](#) (i.e., c3600 series) for this lab study. The topology is given below.



Depending on the topology given above, please add [NM-1FE-TX](#) modules to the routers as many as needed.

Then, configure the interfaces on each of the four routers. This includes assigning an IP address and a subnet mask to all interfaces (including the loopbacks) using the commands described in the previous lab studies. Please do not forget to enable the interfaces using the **no shut** command. Please double check the slot and port numbers.

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

When you are done, to verify the status of the router interfaces, please use the command **show ip interface brief** at the prompt (RouterName#).



Please take screen shot of the ENTIRE SCREEN for all the Routers **SanFrancisco**, **SanDiego**, **LasVegas**, and **Austin**; where we can see the result of the **show ip interface brief** 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.**

ShIP.SF.FirstName.LastName.png
ShIP.SD.FirstName.LastName.png
ShIP.LV.FirstName.LastName.png
ShIP.Au.FirstName.LastName.png

3 Configuring Routes with EIGRP

Before starting the routing configuration, please test if **SanDiego** router is able to ping all 3 interfaces of the **LasVegas** router (not the loopback).

Please take screen shot of the ENTIRE SCREEN for the router **SanDiego**; 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**

P3LV.SD.FirstName.LastName.png

You can now configure EIGRP routing protocol for all routers using **AS number 150**. The AS number is the **autonomous system** number of the EIGRP routing process. The router uses the AS numbers to determine which routers share routing tables. Only routers with the same AS number will share routing updates. Enter the router's configuration mode, and enter the command **router eigrp [AS-number]**. Please note that the prompt changes to (config-router) and the next command entered sets the network to run EIGRP.

```
SanFrancisco#enable
SanFrancisco#configure terminal
SanFrancisco(config)#router eigrp 150
SanFrancisco(config-router)#
```

Next, you should instruct the router to run EIGRP on all of its interfaces using the command **network**. Command **network** requires the use of a class network address (Class A, Class B, Class C) after the network command. This is called **classful addressing**. A class network address or **classful address** is the **network portion of the address for the particular class of the network**.

Class	Address Range			Network Bits/CDIR (Default)
Class A	0.0.0.0	to	127.255.255.255`	8
Class B	128.0.0.0	to	191.255.255.255	16
Class C	192.0.0.0	to	223.255.255.255	24

Address Range for Each Class of Network

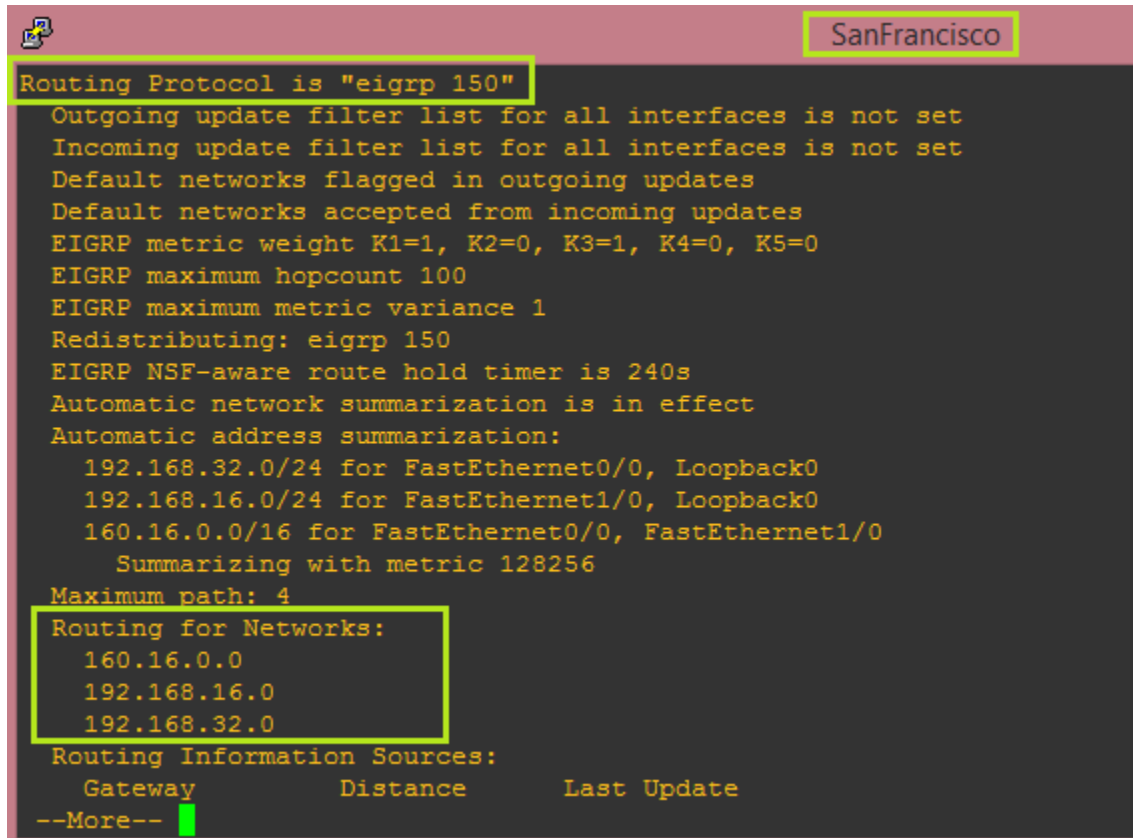
For example, in our network topology we have 192.168.16.0 NET, this is a class C network, and the network portion of the address is 192.168.16.0. To use EIGRP on the "192.168.16.0" network, we need to use the command **network 192.168.16.0**. Let's think about the Loopback 0 interface that we have IP address 160.16.1.1. This is a class B network, and the network portion of the address is 160.16.0.0. To use EIGRP on the "160.16.0.0" network, we should use the command **network 160.16. 0.0**.

```
SanFrancisco#enable
SanFrancisco#configure terminal
SanFrancisco(config)#router eigrp 150
SanFrancisco(config-router)#network 192.168.16.0
SanFrancisco(config-router)#network 192.168.32.0
SanFrancisco(config-router)#network 160.16.0.0
```

Now, the 192.168.16.x, 192.168.32.x, and 160.16.x.x interfaces on Router **SanFrancisco** are configured to run EIGRP. The command **show ip protocol** (sh ip protocol) is used to **display the routing protocols running on the router**.

```
SanFrancisco#enable
SanFrancisco#configure terminal
SanFrancisco(config)#router eigrp 150
SanFrancisco(config-router)#network 192.168.16.0
SanFrancisco(config-router)#network 192.168.32.0
SanFrancisco(config-router)#network 160.16.0.0
```

```
SanFrancisco(config-router)#end
SanFrancisco(config-router)#show ip protocol
```



```
SanFrancisco
Routing Protocol is "eigrp 150"
  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 150
  EIGRP NSF-aware route hold timer is 240s
  Automatic network summarization is in effect
  Automatic address summarization:
    192.168.32.0/24 for FastEthernet0/0, Loopback0
    192.168.16.0/24 for FastEthernet1/0, Loopback0
    160.16.0.0/16 for FastEthernet0/0, FastEthernet1/0
    Summarizing with metric 128256
  Maximum path: 4
  Routing for Networks:
    160.16.0.0
    192.168.16.0
    192.168.32.0
  Routing Information Sources:
    Gateway         Distance         Last Update
  --More--
```

The result of the **show ip protocol** on the Router **SanFrancisco**

Please configure the Router **SanFrancisco** using the commands above. Next, based on the given topology and the information above, please determine what **network** commands you need to run on the Routers **SanDiego**, **LasVegas**, and **Austin**. Then, configure EIGRP routing protocol for the Routers **SanDiego**, **LasVegas**, and **Austin**.



Please take screen shot of the ENTIRE SCREEN for the Routers **SanFrancisco**, **SanDiego**, **LasVegas**, and **Austin**; where we can see the result of the **Routing for Networks:** section of the command **show ip protocol**. 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.**

```
IpP1.SF.FirstName.LastName.png
IpP1.SD.FirstName.LastName.png
IpP1.LV.FirstName.LastName.png
IpP1.Au.FirstName.LastName.png
```

4 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.

ShIP .SF.FirstName.LastName.png	10 points
ShIP .SD.FirstName.LastName.png	10 points
ShIP .LV.FirstName.LastName.png	10 points
ShIP .Au.FirstName.LastName.png	10 points
P3LV .SD.FirstName.LastName.png	5 points
IpP1 .SF.FirstName.LastName.png	5 points
IpP1 .SD.FirstName.LastName.png	15 points
IpP1 .LV.FirstName.LastName.png	15 points
IpP1 .Au.FirstName.LastName.png	20 points

5 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