

Lab 3: EIGRP

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**Purpose:**

The purpose of this lab is to utilize

**Background information on lab concepts:**

Enhanced Interior Gateway Routing Protocol is an advanced distance vector routing protocol based on the principles of the Interior Gateway Routing Protocol (IGRP). IGRP was deployed in 1986 with the concept that each router doesn’t need to know all the router/link relationships for the entire network. Each router advertises destinations with a corresponding distance. Each router hearing the information adjusts the distance and propagates it to neighboring routers.

This unique characteristic improves the operational ability and fast converging rate. It can determine the shortest path distance vector, and it works on the principle of Interior Gateway Routing Protocol, a classless routing protocol. It uses metrics like bandwidth, load and delays to calculate the shortest optimal network route. EIGRP only sends incremental updates, which in short reduces the workload of the routers and the amount of information transmitted.

**Lab Summary:**

Set up 6 routers, 2 routers have 2 serial ports that connect to one another while using load balancing so one router is twice the speed of the other.

**Lab Commands**:

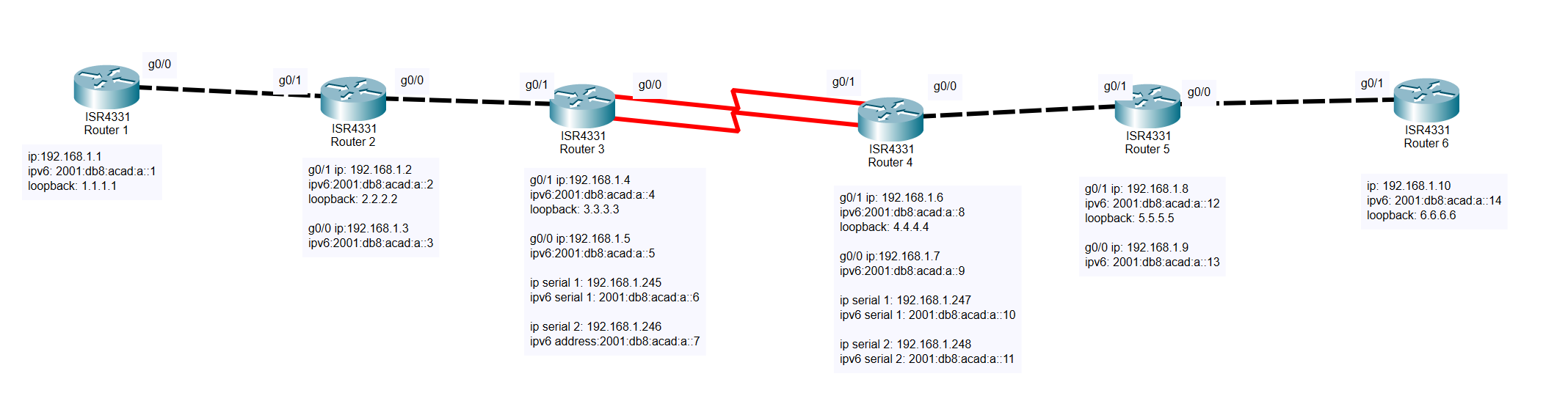
Router eigrp [number] – sets up router eigrp

Ipv6 eigrp 1 – allows ipv6 addresses to connect to eigrp

Variance [number] - allows the router to include routes with a metric smaller than the multiplier times the minimum metric route to that destination

Bandwidth [number] – to communicate the speed of the route

**Network Diagram with IP’s:**



**Configurations:**

**R1:**  
**Config:**

hostname R1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

 address-family ipv4

 exit-address-family

 address-family ipv6

 exit-address-family

no aaa new-model

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214421CF

spanning-tree extend system-id

redundancy

 mode none

vlan internal allocation policy ascending

interface Loopback0

 ip address 1.1.1.1 255.255.255.255

interface GigabitEthernet0/0/0

 ip address 192.168.1.1 255.255.255.0

 negotiation auto

 ipv6 address 2001:DB8:ACAD:A::1/64

 ipv6 enable

interface GigabitEthernet0/0/1

 no ip address

 negotiation auto

interface Serial0/1/0

 no ip address

interface Serial0/1/1

 no ip address

interface GigabitEthernet0

 vrf forwarding Mgmt-intf

 no ip address

 negotiation auto

interface Vlan1

 no ip address

router eigrp 1

 network 192.168.1.0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

 stopbits 1

line aux 0

 stopbits 1

line vty 0 4

 login

end

**R2:**

**Config:**

hostname R2

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

 address-family ipv4

 exit-address-family

 address-family ipv6

 exit-address-family

no aaa new-model

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO211216BL

spanning-tree extend system-id

redundancy

 mode none

vlan internal allocation policy ascending

interface Loopback0

 ip address 2.2.2.2 255.255.255.255

interface GigabitEthernet0/0/0

 ip address 192.168.2.3 255.255.255.0

 negotiation auto

 ipv6 address 2001:DB10:ACAD:A::3/64

 ipv6 enable

interface GigabitEthernet0/0/1

 ip address 192.168.1.2 255.255.255.0

 negotiation auto

 ipv6 address 2001:DB9:ACAD:A::2/64

 ipv6 enable

interface Serial0/1/0

 no ip address

interface Serial0/1/1

 no ip address

interface GigabitEthernet0

 vrf forwarding Mgmt-intf

 no ip address

 negotiation auto

interface Vlan1

 no ip address

router eigrp 1

 network 192.168.1.0

 network 192.168.2.0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

 stopbits 1

line aux 0

 stopbits 1

line vty 0 4

 login

end

**R3:**

**Config:**

hostname R3

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

 address-family ipv4

 exit-address-family

 address-family ipv6

 exit-address-family

no aaa new-model

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420G7

spanning-tree extend system-id

redundancy

 mode none

vlan internal allocation policy ascending

interface Loopback0

 ip address 3.3.3.3 255.255.255.255

interface GigabitEthernet0/0/0

 ip address 192.168.3.5 255.255.255.0

 negotiation auto

 ipv6 address 2001:DB12:ACAD:A::5/64

 ipv6 enable

interface GigabitEthernet0/0/1

 ip address 192.168.2.4 255.255.255.0

 negotiation auto

 ipv6 address 2001:DB11:ACAD:A::4/64

 ipv6 enable

interface Serial0/1/0

 bandwidth 1000

 ip address 192.168.11.245 255.255.255.0

 ipv6 address 2001:DB20:ACAD:A::6/64

interface Serial0/1/1

 bandwidth 2000

 ip address 192.168.12.246 255.255.255.0

 ipv6 address 2001:DB21:ACAD:A::7/64

interface GigabitEthernet0

 vrf forwarding Mgmt-intf

 no ip address

 shutdown

 negotiation auto

interface Vlan1

 no ip address

 shutdown

router eigrp 1

 variance 2

 network 192.168.2.0

 network 192.168.3.0

 network 192.168.11.0

 network 192.168.12.0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

 stopbits 1

line aux 0

 stopbits 1

line vty 0 4

 login

end

**R4:**

**Config:**

Building configuration...

Current configuration : 1984 bytes

Last configuration change at 16:02:22 UTC Fri Nov 5 2021

version 15.5

service timestamps debug datetime msec

service timestamps log datetime msec

no platform punt-keepalive disable-kernel-core

hostname Router1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ipv6 unicast-routing

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21442B21

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface Loopback0

ip address 4.4.4.4 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.4.7 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:ACAD:D::9/64

ipv6 enable

ipv6 eigrp 1

interface GigabitEthernet0/0/1

ip address 192.168.3.6 255.255.255.0

negotiation auto

ipv6 address 2001:DB8:ACAD:A::8/64

ipv6 enable

ipv6 eigrp 1

interface Serial0/1/0

bandwidth 1000

ip address 192.168.11.247 255.255.255.0

ipv6 address 2001:DB23:ACAD:A::10/64

ipv6 enable

ipv6 eigrp 1

interface Serial0/1/1

bandwidth 2000

ip address 192.168.12.248 255.255.255.0

ipv6 address 2001:DB24:ACAD:A::11/64

ipv6 enable

ipv6 eigrp 1

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

router eigrp 1

variance 2

network 192.168.3.0

network 192.168.4.0

network 192.168.11.0

network 192.168.12.0

eigrp router-id 0.0.0.4

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**R5:**

**Config:**

Building configuration...

Current configuration : 3795 bytes

Last configuration change at 16:24:17 UTC Thu Nov 4 2021

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

platform punt-keepalive disable-kernel-core

hostname Router

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

login on-success log

subscriber templating

multilink bundle-name authenticated

crypto pki trustpoint TP-self-signed-2270144787

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-2270144787

revocation-check none

rsakeypair TP-self-signed-2270144787

crypto pki certificate chain TP-self-signed-2270144787

certificate self-signed 01

30820330 30820218 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274

69666963 6174652D 32323730 31343437 3837301E 170D3231 31313034 31353531

34375A17 0D333030 31303130 30303030 305A3031 312F302D 06035504 03132649

4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D32 32373031

34343738 37308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201

0A028201 0100892D A29B0520 41B92FDC C9C0B2E3 C110835D 20F45362 DAB3307C

51D9A8B9 4D23B150 44831B5C 85A76065 1473D785 67A2FBEA FABA2D0A 33B802EE

74A0639C 7272C187 03A3D4CA C53BC937 E6280B9D 70B52F6F 90246873 A215660E

939CD83C 77FAB367 BCA3B04B 05C75BD3 EFB0E669 20E0B540 E02AB74E B31CFECF

B831DC4F C93C7B8D F886357D BEECB046 24177F20 A3C6B302 D16DA085 3E1A440E

4D6D34F8 9AE5114E E9935F0E 66F7C4A0 C61373C6 309D642D FAD59B7F 52D306AC

D5BE2B7D E97DE129 5B9A6820 049500DA 234ABFED C9265F62 B39E1A02 6670A1FA

65969F6E 7BB005CE 2F94321B A6946D04 25E4CCCB 3604A102 5BD706A1 4D302D00

D6B06423 FA1B0203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF

301F0603 551D2304 18301680 14AACA54 22BBD51F 4E5E3B5C ED02A99C 1B56704F

84301D06 03551D0E 04160414 AACA5422 BBD51F4E 5E3B5CED 02A99C1B 56704F84

300D0609 2A864886 F70D0101 05050003 82010100 6BCC3F7A 14FC6716 A82F531C

19002434 D79F93E4 54A53FD9 F8CA2D9A 950C5308 6ACD3CE1 0B9ABFFB 1E3FBBAB

6097A705 22277CE3 7F5C0293 0830920B 514496CD 72DA1364 22EF33DE 6CDA6535

FE5A7552 D06E95A1 98A652AD 5CA00A41 CADD8CB5 AB25885C 2C63646E 0AE556EB

71B57292 ABBB9C21 EF4204EF 53A1E8D6 A76E963C E54D9008 223A8354 0F0959CE

036C0C91 F25F5CA6 020F7B22 D659B794 211ADC95 387D8730 0215ACFE 3FA95049

474651BB 9F600D02 8CB232F4 5D21B8C0 D02CCA3F 164A751C 1E43F19A BD1C36EB

469079D5 BC4C25EF 032BDA28 57247875 9B80F5AF FCEFC70F E0066ADE D60C2084

33248729 7FD5C384 DAF7BACD 2EA2B584 E8C244F0

quit

!

license udi pid ISR4321/K9 sn FLM24060912

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

interface Loopback0

ip address 5.5.5.5 255.255.255.255

interface GigabitEthernet0/0/0

ip address 192.168.5.9 255.255.255.0

negotiation auto

ipv6 address 2001:DB16:ACAD:A::13/64

ipv6 enable

interface GigabitEthernet0/0/1

ip address 192.168.4.8 255.255.255.0

negotiation auto

ipv6 address 2001:DB15:ACAD:A::12/64

ipv6 enable

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

router eigrp 1

network 192.168.4.0

network 192.168.5.0

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**R6:**

**Config:**

Building configuration...

Current configuration : 4013 bytes

Last configuration change at 14:29:39 UTC Fri Nov 5 2021

version 16.9

service timestamps debug datetime msec

service timestamps log datetime msec

platform qfp utilization monitor load 80

no platform punt-keepalive disable-kernel-core

hostname R6

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ip dhcp pool webuidhcp

login on-success log

subscriber templating

ipv6 unicast-routing

multilink bundle-name authenticated

crypto pki trustpoint TP-self-signed-4144679456

enrollment selfsigned

subject-name cn=IOS-Self-Signed-Certificate-4144679456

revocation-check none

rsakeypair TP-self-signed-4144679456

crypto pki certificate chain TP-self-signed-4144679456

certificate self-signed 01

30820330 30820218 A0030201 02020101 300D0609 2A864886 F70D0101 05050030

31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274

69666963 6174652D 34313434 36373934 3536301E 170D3231 30393037 31383030

34325A17 0D333030 31303130 30303030 305A3031 312F302D 06035504 03132649

4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D34 31343436

37393435 36308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201

0A028201 0100BA67 9C68CECE DF4C5219 D621B0C3 5759E928 FCFB209D 3879588F

2B114B21 522BFADE EB1B728C 79283293 69D67DCB 4611989C 0BEE926C 692C9774

20AD717E CAC1C1E9 E2FAA91D ABD0188C A5216978 B036C9D0 4FF4AAD3 290FC23D

0B772A17 8C887111 213A119A FFDCEBB8 60EC6471 0C02A4DF ABF6F068 1B7A6ABE

E5C2E988 3F73764D 744B08E9 342A008D CEF49C5E 9603DCC5 32A61FFB 6F48D4CF

E3955FB4 CB8C852D D3AC156B 6BC9121B 48993B79 8C8EBD47 3F9AE092 1F10D7C2

F02487EE 299DA3E8 42EB310B 5B546277 1FB8F259 F96542B5 A98D3083 66EDDAC5

53383E75 61915548 0B8E34E1 D98511E6 E9B7AB7F 80AAEE5B E8B0CE0D 2C76A987

F15B1847 537B0203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF

301F0603 551D2304 18301680 14A174E1 843ED9A9 3F330802 FA1BF2B9 779AFF1E

AE301D06 03551D0E 04160414 A174E184 3ED9A93F 330802FA 1BF2B977 9AFF1EAE

300D0609 2A864886 F70D0101 05050003 82010100 1D06583A 034ED8B4 20059AFA

CF3B3E1A 123E7616 DCA5AA3D 282DD950 6CB7B01F E7D1BFD6 F281F557 25F5817E

ABC38ACF E8B10ECB C39C5716 13DFD700 674D4948 EC197541 54DF2104 36EF8BEF

EA1E9846 606E370C A2AE499B 53F52687 864796D5 2FB17680 DBA7E29D 12D3DCD2

56CDB1E7 CE9A106A 82C7728A 5831BD65 840979D9 C7811CB1 C80C6B3F A39613DD

49A3C68D 472C2859 053C0C78 FB86D8CD A768B581 B1965171 7DF9D10A 706AA6CA

C888EF78 275572ED D13323C0 E84F6408 1F717C24 0FEFAD8B C8BAE091 74E776D8

4CEF34A5 502090F6 C56938FC 75603789 61F8F417 5C6F0D9A 629CC183 76D230F7

D54619FB 780C3598 7EBB821E 94A161DE F9A1F2F0

quit

license udi pid ISR4321/K9 sn FLM2408005M

no license smart enable

diagnostic bootup level minimal

spanning-tree extend system-id

redundancy

mode none

interface Loopback0

ip address 6.6.6.6 255.255.255.255

ipv6 address dhcp

ipv6 address autoconfig

ipv6 enable

ipv6 dhcp client request vendor

interface GigabitEthernet0/0/1

ip address 192.168.5.10 255.255.255.0

negotiation auto

ipv6 address 2001:DB17:ACAD:A::14/64

ipv6 enable

interface GigabitEthernet0/2/0

no ip address

shutdown

negotiation auto

interface GigabitEthernet0/2/1

no ip address

shutdown

negotiation auto

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

router eigrp 1

network 192.168.5.0

ip forward-protocol nd

ip http server

ip http authentication local

ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

transport input none

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

**Serial ip routes:**

**R3:**

Routing entry for 192.168.4.0/24

Known via "eigrp 1", distance 90, metric 1792256, type internal

Redistributing via eigrp 1

Last update from 192.168.11.247 on Serial0/1/0, 00:07:54 ago

Routing Descriptor Blocks:

\* 192.168.12.248, from 192.168.12.248, 00:07:54 ago, via Serial0/1/1

Route metric is 1792256, traffic share count is 12

Total delay is 20010 microseconds, minimum bandwidth is 2000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

192.168.11.247, from 192.168.11.247, 00:07:54 ago, via Serial0/1/0

Route metric is 3072256, traffic share count is 7

Total delay is 20010 microseconds, minimum bandwidth is 1000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

**R4:**

Router#show ip route 192.168.2.0

Routing entry for 192.168.2.0/24

Known via "eigrp 1", distance 90, metric 1792256, type internal

Redistributing via eigrp 1

Last update from 192.168.11.245 on Serial0/1/0, 00:05:09 ago

Routing Descriptor Blocks:

\* 192.168.12.246, from 192.168.12.246, 00:05:09 ago, via Serial0/1/1

Route metric is 1792256, traffic share count is 12

Total delay is 20010 microseconds, minimum bandwidth is 2000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

192.168.11.245, from 192.168.11.245, 00:05:09 ago, via Serial0/1/0

Route metric is 3072256, traffic share count is 7

Total delay is 20010 microseconds, minimum bandwidth is 1000 Kbit

Reliability 255/255, minimum MTU 1500 bytes

Loading 1/255, Hops 1

**Problem Section:**

We had a hard time setting up the ip addresses with the serial routes because it sent a reoccurring message saying that the subnet was incompatible. After we fixed that we tried to get the ip roues between the serial ports but couldn’t get them to show. What we did to fix it was ip the routes connecting to the serial ports which allowed us to get the correct pings. I realized you cannot see ip routes if the serial ports are directly connected unless you another interface connecting to it. We had some problems with the Cisco version because it made it hard to set up ipv6 addresses.

**Conclusion:**

We set up 6 routers to communicate with eigrp through serial ports. We had some issues with ip addressing but it was figured out and now I realize I need to make ip addresses not have the same subnets.