EIGRP Characteristics

- EIGRP (Enhanced Interior Gateway Routing Protocol) is an Advanced Distance Vector routing protocol
- It supports large networks
- It has very fast convergence time
- It supports bounded updates where network topology change updates are only sent to routers affected by the change
- Messages are sent using multicast

EIGRP Characteristics

- EIGRP will automatically perform equal cost load balancing on up to 4 paths by default
- This can be increased up to 16 paths
- EIGRP can also be configured to perform unequal cost load balancing

EIGRP Configuration – AS number

```
R1(config)#router eigrp 100
```

- '100' in this example is the Autonomous System (AS), meaning an independent administrative domain. EIGRP routers need to have the same Autonomous System number to peer with each other.

EIGRP Configuration - network

```
R1(config)#router eigrp 100
R1(config-router)#network 10.0.0.0 0.0.255.255
```

- The network command uses a wildcard mask which is the inverse of a subnet mask.
- Subtract each octet in the subnet mask from 255 to calculate the wildcard mask
- A subnet mask of 255.255.0.0 equals a wildcard mask of 0.0.255.255
- A subnet mask of 255.255.255.252 equals a wildcard mask of 0.0.0.3

EIGRP Configuration - network

```
R1(config)#router eigrp 100
R1(config-router)#network 10.0.0.0
```

- If you do not enter a wildcard mask, the command defaults to using the classful boundary
- 0.255.255.255 for a Class A address
- 0.0.255.255 for a Class B address
- 0.0.0.255 for a Class C address

EIGRP Configuration - network

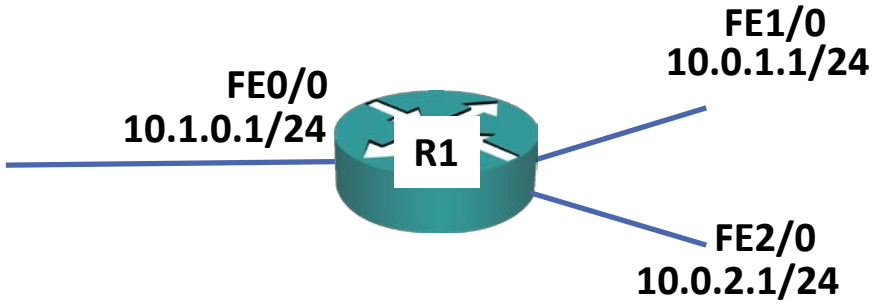
```
R1(config-router)# network 10.0.0.0 0.0.255.255
```

- The network command means:
  - Look for interfaces with an IP address which falls within this range.
  - Enable EIGRP on those interfaces – send out and listen for EIGRP hello messages, and peer with adjacent EIGRP routers.
  - Advertise the network and mask which is configured on those interfaces.

EIGRP Configuration Example - network

```
R1(config-router)# network 10.0.0.0
```

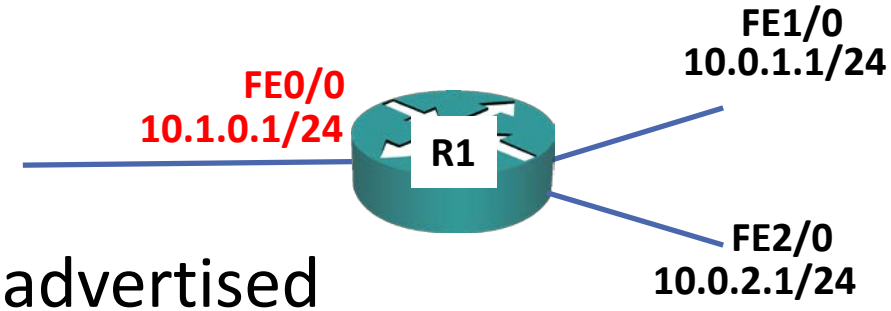
- A default Class A wildcard of 0.255.255.255 will be used
- All interfaces fall within this range in our example
- EIGRP will be enabled on all interfaces and the router will peer with adjacent EIGRP routers
- Networks advertised:
  - 10.1.0.0/24
  - 10.0.1.0/24
  - 10.0.2.0/24
  - 10.0.0.0/8 is NOT advertised



EIGRP Configuration Example - network

```
R1(config-router)# network 10.0.0.0 0.0.255.255
```

- Interface FE1/0 and FE2/0 fall within this range, FE0/0 does not
- EIGRP will be enabled on FE1/0 and FE2/0 and the router will peer with adjacent EIGRP routers
- Networks advertised:
  - 10.0.1.0/24
  - 10.0.2.0/24
  - 10.1.0.0/24 is NOT advertised
  - 10.0.0.0/16 is NOT advertised

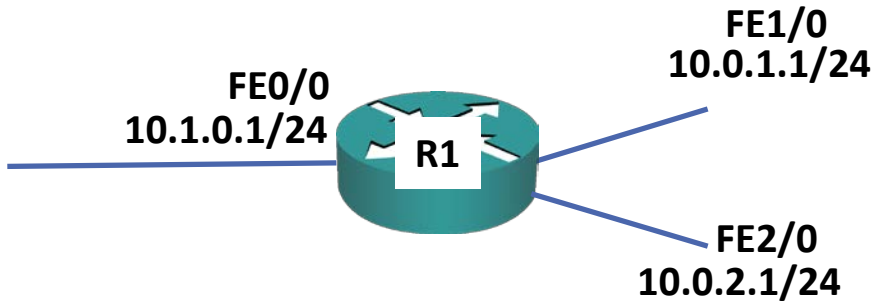


EIGRP Configuration Example - network

- Two different configurations, same result:

```
R1(config-router)# network 10.0.0.0
```

```
R1(config-router)# network 10.1.0.0 0.0.0.255
R1(config-router)# network 10.0.1.0 0.0.0.255
R1(config-router)# network 10.0.2.0 0.0.0.255
```

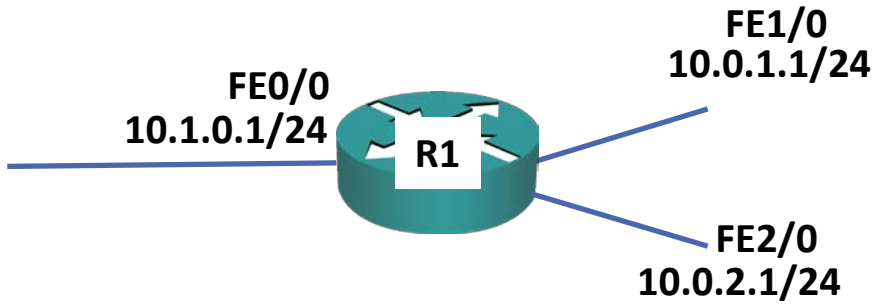


EIGRP Configuration Example - network

- Two different configurations, same result:

```
R1(config-router)# network 10.0.0.0
```

```
R1(config-router)# network 10.1.0.1 0.0.0.0
R1(config-router)# network 10.0.1.1 0.0.0.0
R1(config-router)# network 10.0.2.1 0.0.0.0
```



EIGRP Router ID

- EIGRP routers identify themselves using an EIGRP Router ID which is in the form of an IP address.
- This will default to being the highest IP address of any loopback interfaces configured on the router, or the highest other IP address if a loopback does not exist.
- Loopback interfaces never go down so the Router ID will not change.
- You can also manually specify the Router ID.
- Best practice is to use a Loopback or manually set the Router ID.

EIGRP Router ID – No Loopback


```
R1#sh ip int brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        10.0.0.1        YES NVRAM  up                    up
FastEthernet1/0        10.0.1.1        YES NVRAM  up                    up
FastEthernet2/0        10.0.2.1        YES NVRAM  up                    up
FastEthernet3/0        10.0.3.1        YES NVRAM  up                    up

R1#show ip protocols
*** IP Routing is NSF aware ***

Routing Protocol is "eigrp 100"
  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-IPv4 Protocol for AS(100)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID: 10.0.3.1
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1
```

EIGRP Router ID - Loopback

```
R1#sh ip int brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        10.0.0.1        YES NVRAM  up                    up
FastEthernet1/0        10.0.1.1        YES NVRAM  up                    up
FastEthernet2/0        10.0.2.1        YES NVRAM  up                    up
FastEthernet3/0        10.0.3.1        YES NVRAM  up                    up
Loopback0              1.1.1.1         YES manual up                    up

R1#sh ip proto
*** IP Routing is NSF aware ***

Routing Protocol is "eigrp 100"
  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-IPv4 Protocol for AS(100)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID: 1.1.1.1
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1
```

- If a loopback or higher IP address is configured after EIGRP has been set up, the Router ID will change on EIGRP process restart.

EIGRP Router ID – Manually Configured

```
R1(config-router)#router eigrp 100
R1(config-router)#eigrp router-id 2.2.2.2

R1#sh ip proto
*** IP Routing is NSF aware ***

Routing Protocol is "eigrp 100"
  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-IPv4 Protocol for AS(100)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    NSF-aware route hold timer is 240
    Router-ID: 2.2.2.2
    Topology : 0 (base)
      Active Timer: 3 min
      Distance: internal 90 external 170
      Maximum path: 4
      Maximum hopcount 100
      Maximum metric variance 1
```