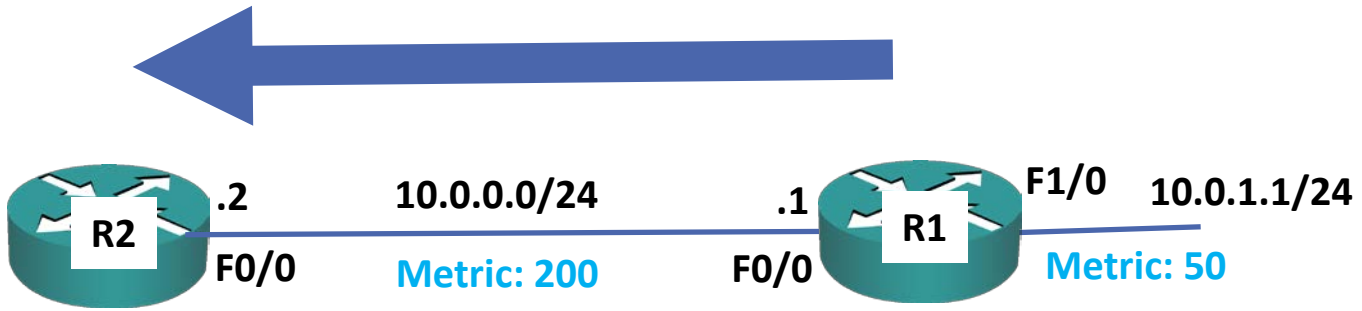
EIGRP Metric Calculation

- As EIGRP is a Distance Vector routing protocol, it will receive routes from its neighbours with their metric to the destination networks
- It will then add its metric to reach the neighbour to get the total metric to the destination network
- If multiple routes are available, the route (or equal cost routes) with the best metric will make it into the routing table

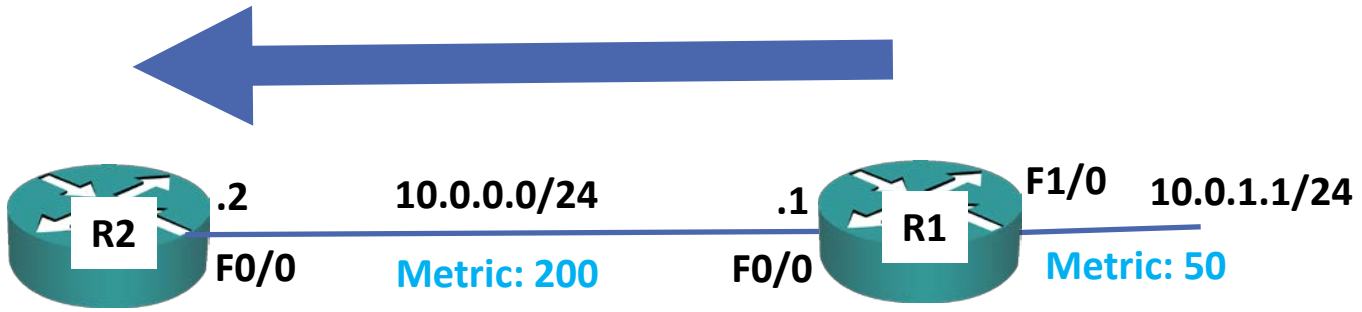
Reported Distance (aka Advertised Distance)

R1 to R2: 'I can reach 10.0.1.0/24 with a metric of 50'



Reported Distance (aka Advertised Distance)

R2: ‘R1, out F0/0 and with a next hop address of 10.0.0.1, can reach 10.0.1.0/24 with a metric of 50. That is the reported distance on that path’

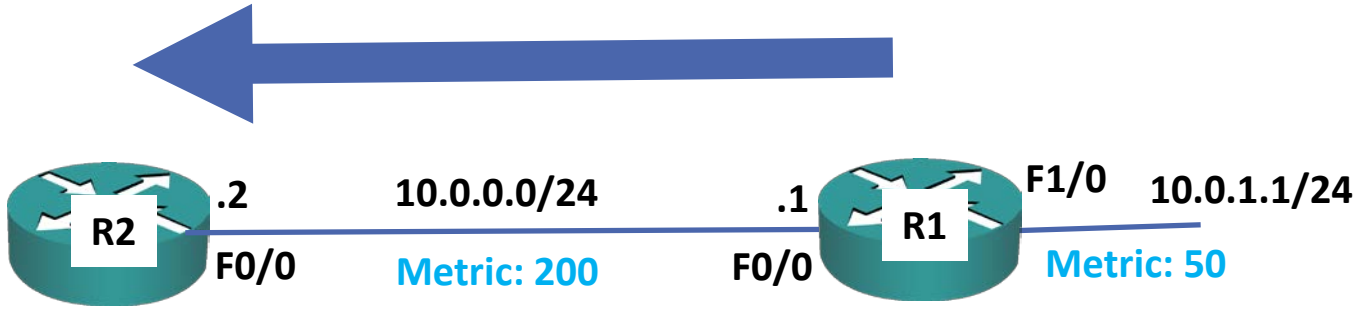


- Reported Distance: Neighbor’s metric to reach destination

Feasible Distance

R2: 'My metric to get to R1 at 10.0.0.1 is 200.

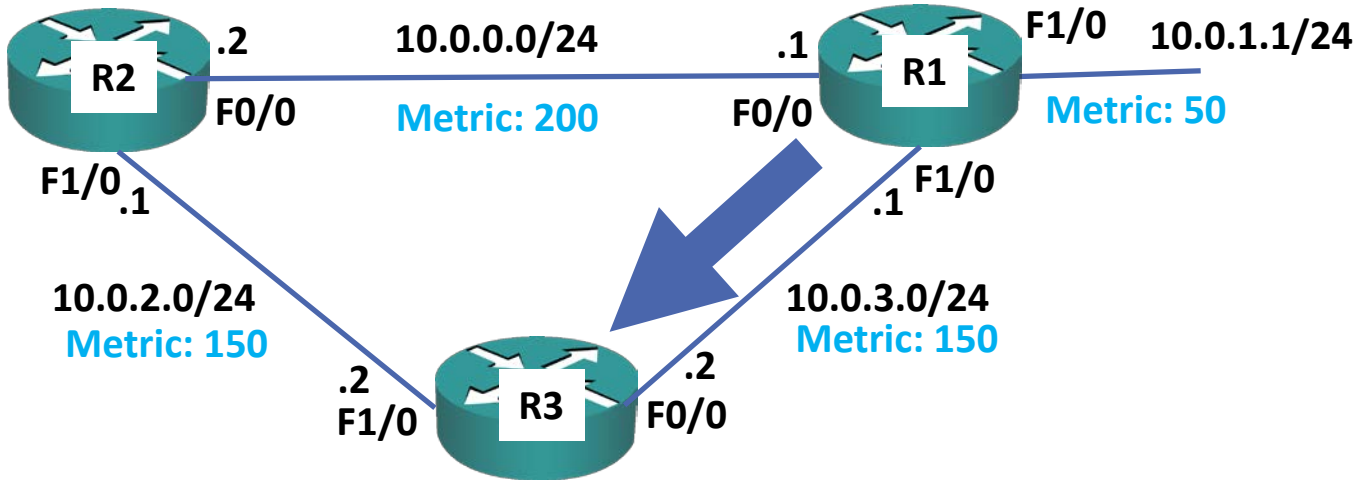
200 + R1's Reported Distance of 50 means my metric to get to 10.0.1.0/24 along this path is 250. That is the Feasible Distance'



- Feasible Distance = Reported Distance + Metric to reach neighbor

Reported Distance (aka Advertised Distance)

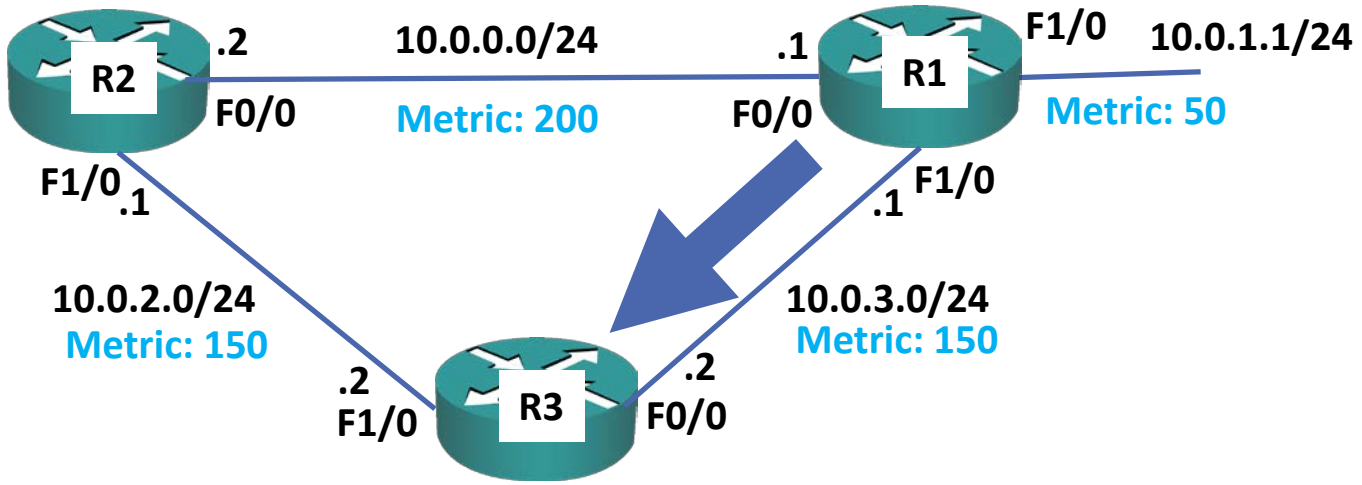
R1 to R3: 'I can reach 10.0.1.0/24 with a metric of 50'



Feasible Distance

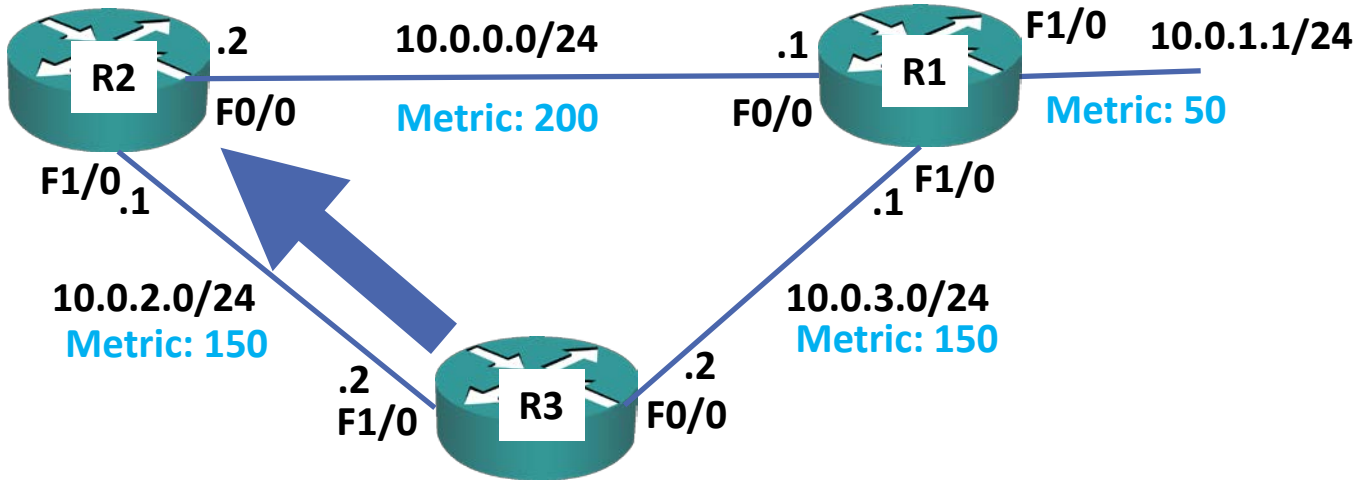
R3: ‘My metric to get to R1 at 10.0.3.1 is 150.

150 + R1’s Reported Distance of 50 means my metric to get to 10.0.1.0/24 along this path is 200. That is the Feasible Distance’



Reported Distance (aka Advertised Distance)

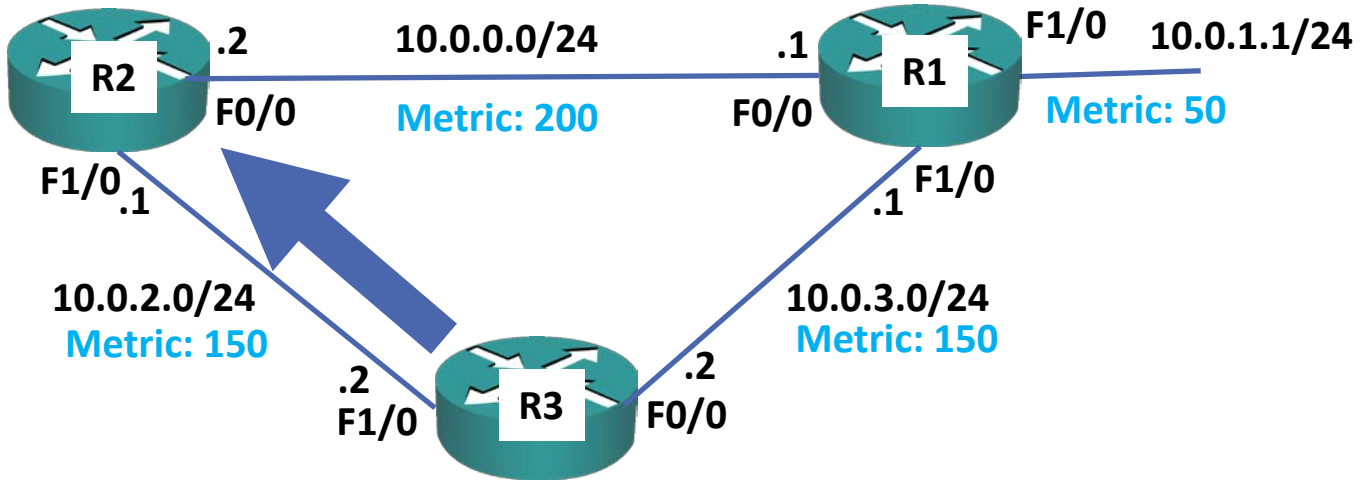
R3 to R2: 'I can reach 10.0.1.0/24 with a metric of 200'



Feasible Distance

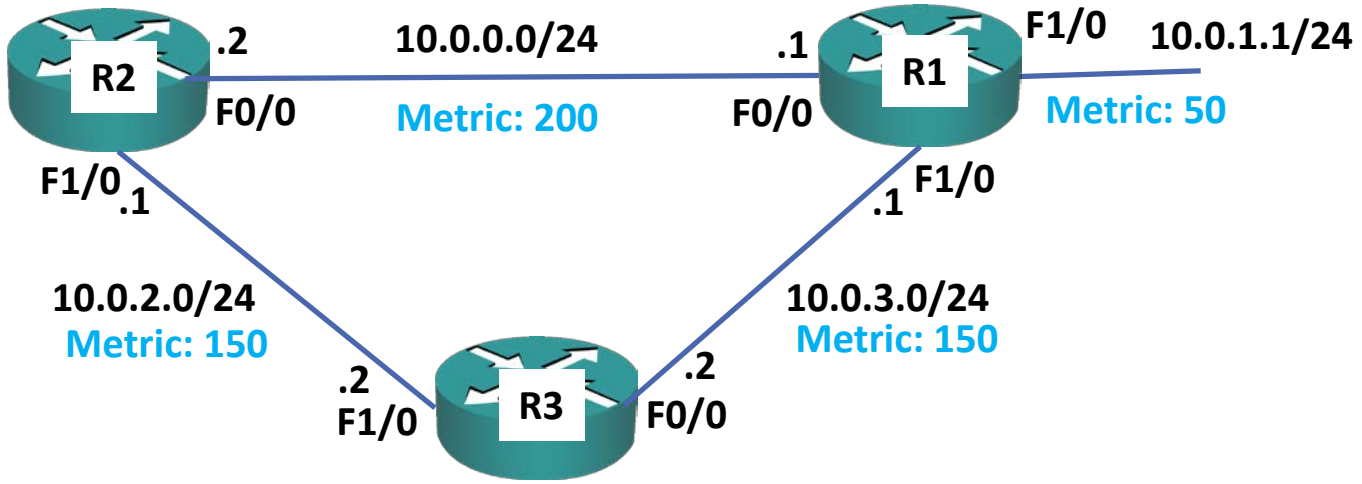
R2: ‘My metric to get to R3 at 10.0.2.2 is 150.

150 + R3’s Reported Distance of 200 means my metric to get to 10.0.1.0/24 along this path is 350. That is the Feasible Distance’



Feasible Distance

- Only the best route makes it into the routing table.
  R2: 'I have 2 possible paths to get to 10.0.1.0/24.
  Via R1 at 10.0.0.1 with a Feasible Distance of 250.
  Via R3 at 10.0.2.2 with a Feasible Distance of 350.
  The route via R1 has the lowest Feasible Distance so I'll insert it into my Routing Table.'

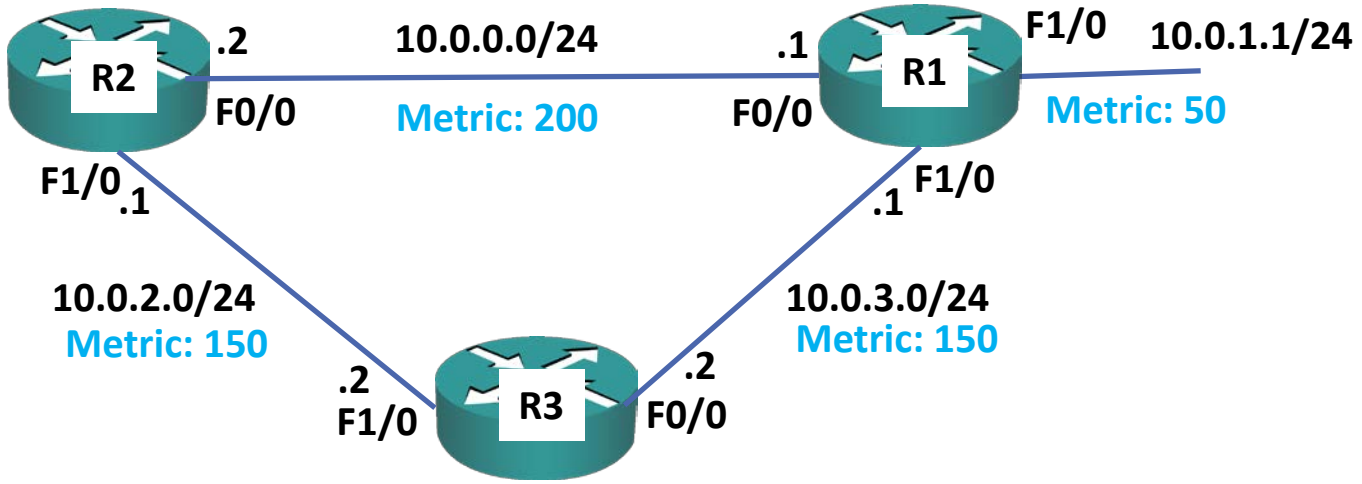


Successors and Feasible Successors

- EIGRP's best (lowest metric) path to a destination is known as the *Successor* route
- When a successor route goes down, the router will query EIGRP peers in an attempt to find a different route to that destination.
- Queries take time and use resources, so it is preferable to avoid them.
- EIGRP routers can do this by storing backup routes, known as *Feasible Successors*, when certain requirements are met.
- If a feasible successor is available when a successor route goes down, the router will immediately fail over to it with no need to send a query.

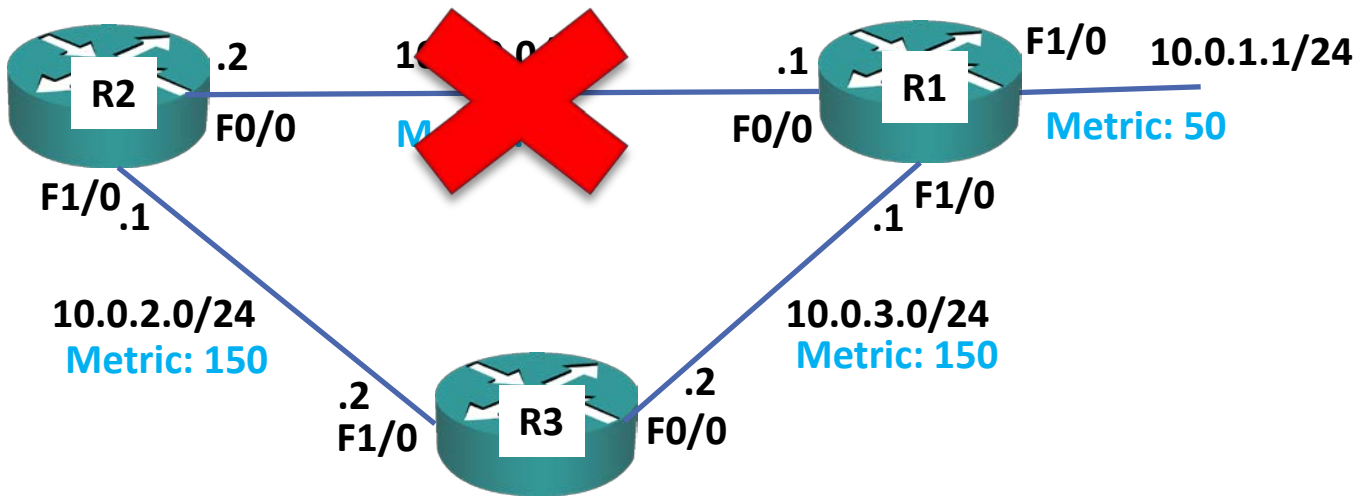
Successors and Feasible Successors

- **A route qualifies as a Feasible Successor if its Reported Distance is lower than the Feasible Distance of the current Successor Route.**
- In our example, R2 sees that the path via R3 to 10.0.1.0/24 has a Reported Distance of 200.
- This is lower than the Feasible Distance of the Successor Route via R1 (250), so it qualifies as a Feasible Successor.



Successors and Feasible Successors

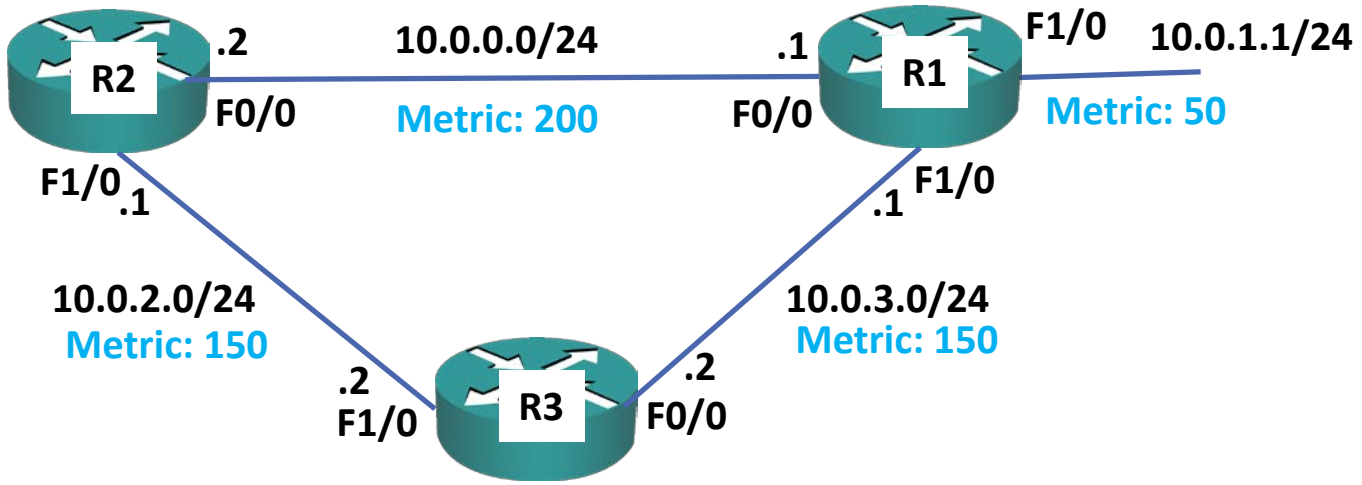
- If the link to R1 goes down, R2 will immediately fail over to the path via R3 without having to send out a query.



show ip eigrp topology

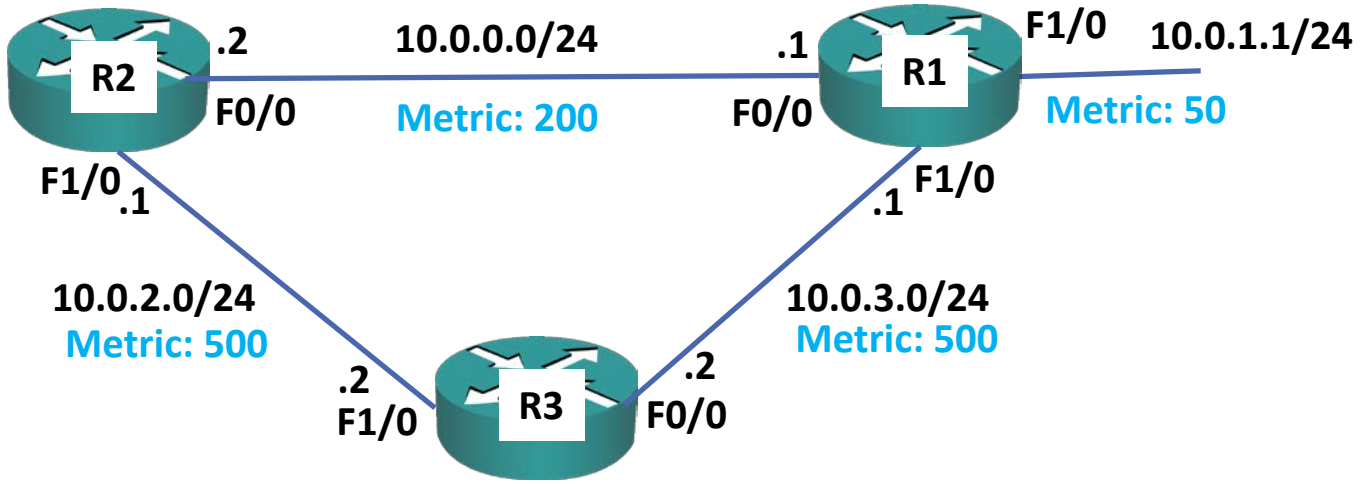
```
R2#sh ip eigrp topology
EIGRP-IPv4 Topology Table for AS(100)/ID(10.0.0.2)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status

P 10.0.1.0/24, 1 successors, FD is 250
        via 10.0.0.1 (250/50), FastEthernet0/0
        via 10.0.2.2 (350/200), FastEthernet1/0
[truncated]
```



Successors and Feasible Successors

- In this new example, R2 sees that the path via R3 to 10.0.1.0/24 has a Reported Distance of 550.
- This is higher than the Feasible Distance of the Successor Route via R1 (250), so it does not qualify as a Feasible Successor.
- If the link to R1 goes down, R2 will send a query to its neighbours asking if they have an alternative route to get to 10.0.1.0/24.

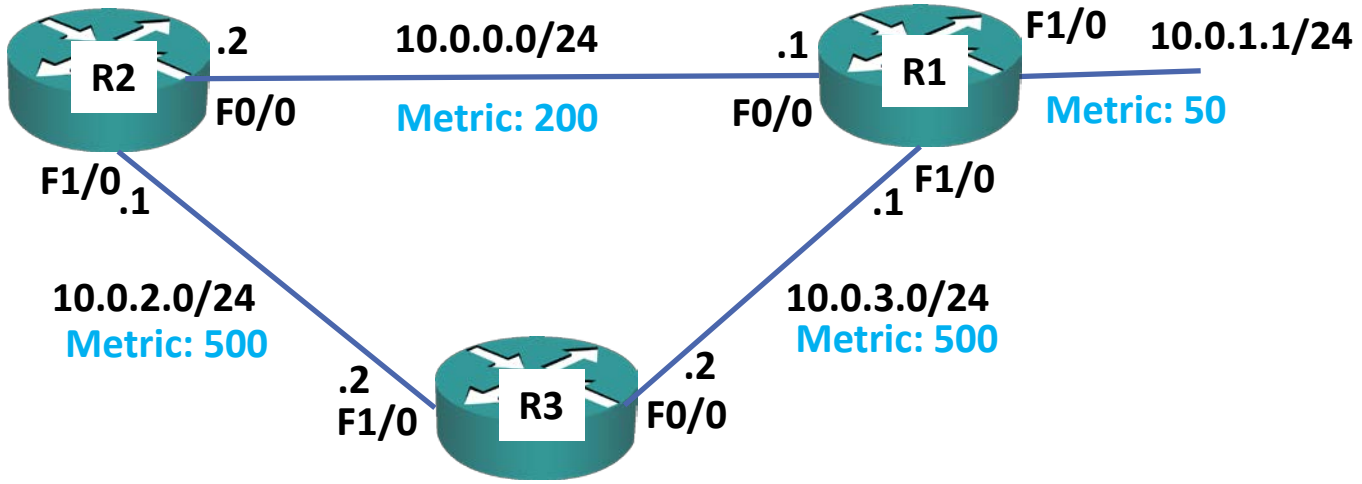


show ip eigrp topology

- ‘show ip eigrp topology’ shows only Successors and Feasible Successors

```
R2#sh ip eigrp topology
EIGRP-IPv4 Topology Table for AS(100)/ID(10.0.0.2)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status

P 10.0.1.0/24, 1 successor, FD is 250
        via 10.0.0.1 (250/50), FastEthernet0/0
[truncated]
```



show ip eigrp topology

- ‘show ip eigrp topology all-links’ shows all paths

```
R2#sh ip eigrp topology all-links
EIGRP-IPv4 Topology Table for AS(100)/ID(10.0.0.2)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - reply Status, s - sia Status

P 10.0.1.0/24, 1 successors, FD is 250
        via 10.0.0.1 (250/50), FastEthernet0/0
        via 10.0.2.2 (1050/550), FastEthernet0/0
[truncated]
```