

EIGRP Metric:

EIGRP uses metric to select the best route from all available routes for destination. Metric has five components. 1. Bandwidth, 2. Load, 3. Delay, 4. Reliability and 5. MTU. From these only bandwidth and delay are by default enabled.

K Value	Component	Description
K1	Bandwidth	Lowest bandwidth of route
K2	Load	Worst load on route based on packet rate
K3	Delay	Cumulative interface delay of route
K4	Reliability	Worst reliability of route based on keep alive
K5	MTU	Smallest MTU in path [Not used in route calculation]

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

Routing Protocol is "eigrp 1"
  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
  Redistributing: eigrp 1
  EIGRP-IPv4 Protocol for AS(1)
    Metric weight K1=1, K2=0, K3=1, K4=0, K5=0
```

Bandwidth (K1):

EIGRP picks lowest bandwidth from all outgoing interfaces of route to the destination network. Bandwidth is amount of data that can be transmitted in a fixed amount of time.

Load (K2):

Load is a dynamic value that changes frequently. It is based on packet rate and bandwidth of interface. It calculates the volume of traffic passing through the interface in comparison of maximum capacity. It is expressed on a scale of 255 where 1 represent that an interface is empty and 255 represent that an interface is fully utilized. Since data flows from both directions, router maintains two separate metric counters: Txload for outgoing traffic and Rxload for incoming traffic.

Delay (K3):

Delay reflects the time taken by a packet in crossing the interface. It is measured in fractions of seconds.

Reliability (K4):

Just like load, reliability is also a dynamic value. It compares all successfully received frames against all received frames. 100 % reliability indicates that all the frames, which we received, were good. We do not have any issue with physical link. If we have any issue with physical link, this value will be decrease.

MTU (K5):

MTU stands for Maximum Transmission Unit. It is advertised with routing update but it does not actively participate in metric calculation.

```
R1#show interfaces fastEthernet 0/0
FastEthernet0/0 is up, line protocol is up
  Hardware is i82543 (Livengood), address is ca04.057c.0008
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec
  reliability 255/255, txload 1/255, rxload 1/255
```

Autonomous System:

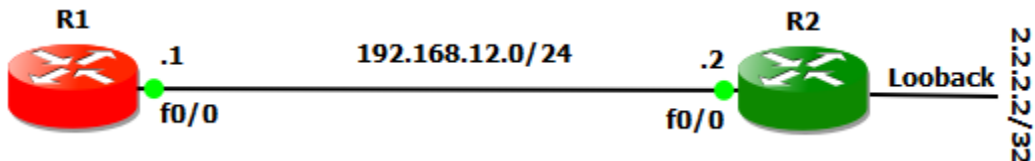
EIGRP shares routing information only with neighbors. In order to become a neighbor AS number must be matched. AS create a logical boundary for route information. By default, router will not propagate route information outside the AS.

Path Metric Calculation:

EIGRP Metric = $256 * ((10^7 / \text{min. BW}) + \text{Delay})$

= $256 * ((10000000 / \text{Minimum BW}) + \text{Sum of Interface Delays} / 10)$

Where Bandwidth = $10000000 / \text{bandwidth (i)}$, where bandwidth (i) is the least bandwidth of all outgoing interfaces on the route to the destination network represented in kilobits. Delay = delay (i) where delay (i) is the sum of the delays configured on the interfaces, on the route to the destination network, in tens of microseconds.



```
R1#show ip route eigrp
```

```
2.0.0.0/32 is subnetted, 1 subnets
D    2.2.2.2 [90/156160] via 192.168.12.2, 00:12:16, FastEthernet0/0
```

```
R1#show interfaces f0/0
```

```
FastEthernet0/0 is up, line protocol is up
  Hardware is DEC21140, address is ca01.06cc.0000 (c)
  Internet address is 192.168.12.1/24
  MTU 1500 bytes, BW 100000 Kbit/sec, DLY 100 usec,
```

```
R2#show int loopback 2
```

```
Loopback2 is up, line protocol is up
  Hardware is Loopback
  Internet address is 2.2.2.2/32
  MTU 1514 bytes, BW 8000000 Kbit/sec, DLY 5000 usec,
  reliability 255/255, txload 1/255, rxload 1/255
```

EIGRP Metric = $256 * ((10000000 / \text{Minimum BW}) + \text{Sum of Interface Delays} / 10)$

EIGRP Metric = $256 * (10000000 / 100000) + 100 + 5000 / 10$

EIGRP Metric = $256 * (100) + 5100 / 10$

EIGRP Metric = $256 * (100) + 510$

EIGRP Metric = $256 * 610$

EIGRP Metric = **156160**