

OSPF - External Route - E1 vs E2

In ospf, when we redistribute external route from any other routing protocol like BGP, EIGRP, or even static into OSPF, we call it "external route". The router is also known as ASBR (autonomous system boundary router). External routes will flood to the entire OSPF domain with LSA type 5.

But when we check the global rib table with #show ip route command, we see that there is an "E2" ("N2") / "E1" ("N1") sign in front of the external route.

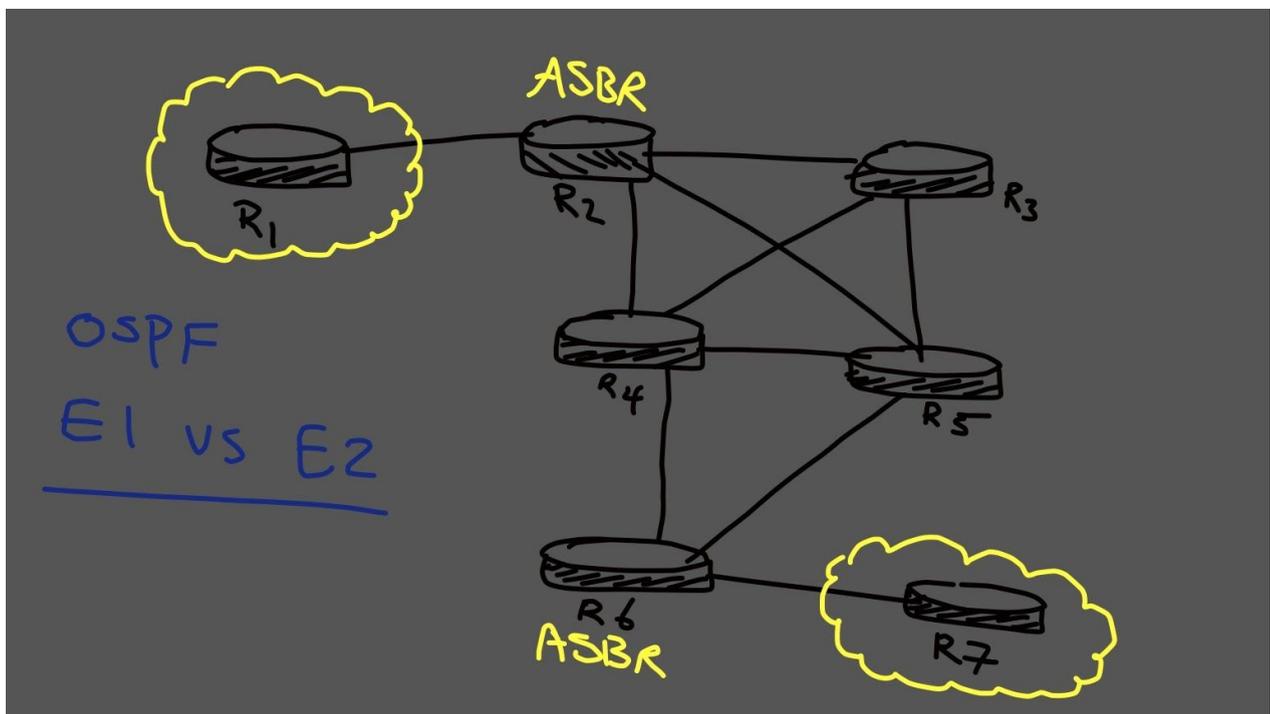
Simply E1 and E2's story is all about metric and nothing more.

We have the same story for N1 and N2 routes.

E2 (N2)

In type 2, the equation is --> E2 (N2) metric = redistribution metric.

please check the scenario



In our topology from "R5" to reach ASBR1 (R2) cost is "1" and to reach ASBR 2 (R6) cost is also "1".

Both these routers are redistributing EIGRP external route into OSPF.

From router R5 to reach EIGRP route ([1.1.1.1/32](#)) behind "ASBR 1 " also cost is 1 (same as reach "ASBR1") and to reach to EIGRP route ([7.7.7.7/32](#)) behind "ASBR 2" cost is "1" which is the same cost to reach "ASBR 2."

External OSPF Type 2 routes do not increment in metric

```

E#
E#sh ip route 1.1.1.1
Routing entry for 1.1.1.1/32
  Known via "ospf 1", distance 110, metric 20, type extern 2, forward metric 1
  Last update from 25.25.25.2 on GigabitEthernet0/3, 00:17:00 ago
  Routing Descriptor Blocks:
    * 25.25.25.2, from 20.20.20.20, 00:17:09 ago, via GigabitEthernet0/3
      Route metric is 20, traffic share count is 1
E#sh ip route 7.7.7.7
Routing entry for 7.7.7.7/32
  Known via "ospf 1", distance 110, metric 20, type extern 2, forward metric 1
  Last update from 56.56.56.6 on GigabitEthernet0/4, 00:19:07 ago
  Routing Descriptor Blocks:
    * 56.56.56.6, from 60.60.60.60, 00:19:07 ago, via GigabitEthernet0/4
      Route metric is 20, traffic share count is 1
E#!
  
```

EIGRP Rate from ASBR 1

EIGRP Rate from ASBR 2

E1 (N1)

In type 1, the equation is $\text{metric} = \text{redistribution metric} + \text{metric to reach external route}$.
 For example in router F cost to reach EIGRP route (7.7.7.7) is 100,

```

router eigrp 1
 network 67.67.67.0 0.0.0.255
router ospf 1
 router-id 60.60.60.60
 redistribute eigrp 1 metric 100 subnets
F#
  
```

metric to reach external route!

If we check the "router E," we can see that even when we increase the cost to reach the EIGRP route to 100 on "router F," Still nothing changes for it.

```

E#sh ip route 7.7.7.7
Routing entry for 7.7.7.7/32
  Known via "ospf 1", distance 110, metric 100, type extern 2, forward metric 1
  Last update from 56.56.56.6 on GigabitEthernet0/4, 00:00:19 ago
  Routing Descriptor Blocks:
    * 56.56.56.6, from 60.60.60.60, 00:00:19 ago, via GigabitEthernet0/4
      Route metric is 100, traffic share count is 1
E#
  
```

E2

Let's change the type of external route to "type 1" or E1.

In the picture below, you can see the configuration guide for it.

```

F(config)#router os 1
F(config-router)#redistribute eigrp 1 metric 100 ?
  metric-type OSPF/IS-IS exterior metric type for redistributed routes
  nssa-only   Limit redistributed routes to NSSA areas
  route-map   Route map reference
  subnets    Consider subnets for redistribution into OSPF
  tag         Set tag for routes redistributed into OSPF
  <cr>

F(config-router)#redistribute eigrp 1 metric 100 metr
F(config-router)#redistribute eigrp 1 metric 100 metric-type ?
  1 Set OSPF External Type 1 metrics
  2 Set OSPF External Type 2 metrics

F(config-router)#redistribute eigrp 1 metric 100 metric-type 1
  
```

And now it's time for verification:

```
E#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
a - application route
+ - replicated route, % - next hop override, p - overrides from PfR

Gateway of last resort is not set

  1.0.0.0/32 is subnetted, 1 subnets
O E2   1.1.1.1 [110/20] via 25.25.25.2, 01:23:16, GigabitEthernet0/3
  7.0.0.0/32 is subnetted, 1 subnets
O E1   7.7.7.7 [110/101] via 56.56.56.6, 00:00:07, GigabitEthernet0/4
 12.0.0.0/24 is subnetted, 1 subnets
O E2   12.12.12.0 [110/20] via 25.25.25.2, 01:23:16, GigabitEthernet0/3
 23.0.0.0/24 is subnetted, 1 subnets
O      23.23.23.0 [110/2] via 35.35.35.3, 01:50:49, GigabitEthernet0/1
        [110/2] via 25.25.25.2, 01:50:49, GigabitEthernet0/3
 24.0.0.0/24 is subnetted, 1 subnets
--More--
```

As you can see the sign before the 7.7.7.7 route changed to "E1."

And here is the detailed output. the forwarding metric changed to "101."

```
E#sh ip route 7.7.7.7
Routing entry for 7.7.7.7/32
  Known via "ospf 1", distance 110, metric 101, type extern 1
  Last update from 56.56.56.6 on GigabitEthernet0/4, 00:00:23 ago
Routing Descriptor Blocks:
  * 56.56.56.6, from 60.60.60.60, 00:00:23 ago, via GigabitEthernet0/4
    Route metric is 101, traffic share count is 1
E#
```

100 = cost to reach external route + 1 metric to reach ASBR

Important notes:

- E2 is the default external type in ospf.
- E2 routes do not increment in metric
- Please consider that E1 routes are preferred over E2 routes
- same for N1 and N2
- An ABR does not install E2 and N2 route into RIB at same time
- An ABR does not install O E1 and O N1 routes into the RIB at the same time
- don't forget N>E :)

I hope you enjoyed it. I am waiting for your feedback.