

ECMP

ECMP (. Equal-cost multi-path routing) - , () preference cost. preference cost . ECMP .

ECMP OSPF BGP. OSPF multipath - 16, BGP multipath - 1.

multipath OSPF maximum-paths OSPF-.

```
ESR# configure
ESR(config)# router ospf 1
ESR(config-ospf)# maximum-paths ?
1-32 Number of paths
```

ECMP IBGP- EBGP- multipath :

```
ESR(config)# router bgp maximum-paths ?
1-16 Number of paths
```

multipath nexthop. multipath, ECMP FIB.

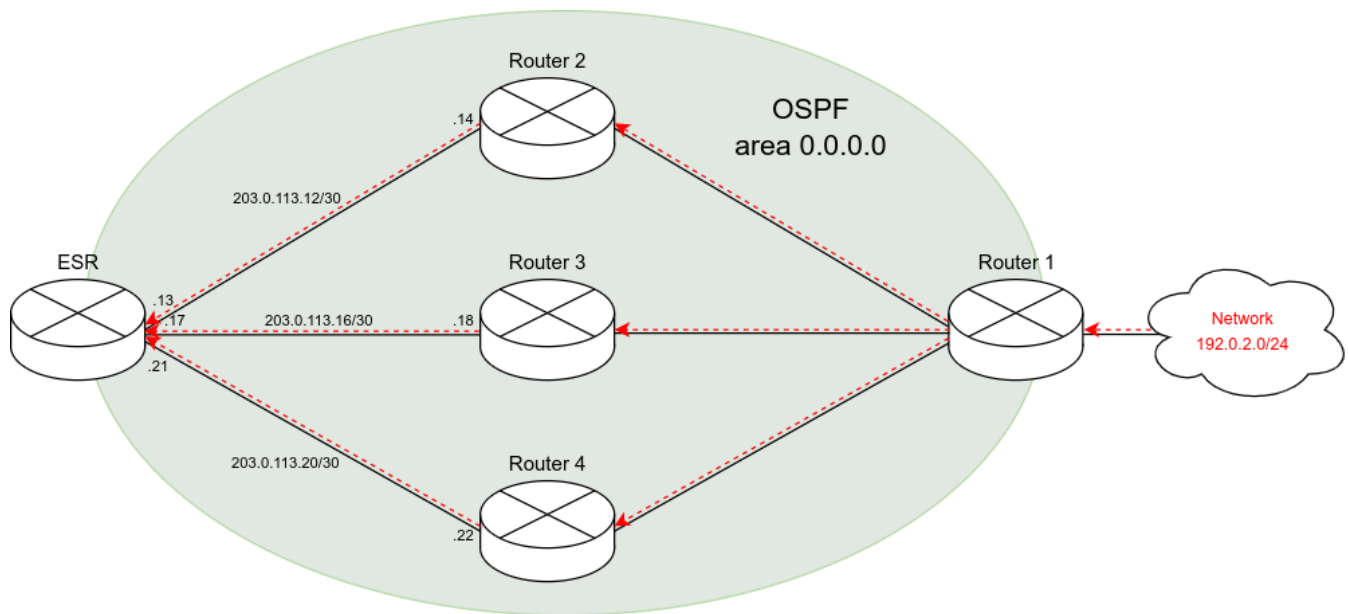
multipath OSPF:

```
ESR# show ip route
Codes: C - connected, S - static, R - RIP derived,
O - OSPF derived, IA - OSPF inter area route,
E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - FIB route

O      * 192.0.2.1/32    [150/30]          multipath          [ospf1 01:10:43] (1.1.1.1)
      via 198.51.100.2 on gil/0/1.2 weight 1
      via 198.51.100.6 on gil/0/1.3 weight 1
      via 198.51.100.10 on gil/0/1.4 weight 1
      via 198.51.100.14 on gil/0/1.5 weight 1
      via 198.51.100.18 on gil/0/1.6 weight 1
      via 198.51.100.22 on gil/0/1.7 weight 1
```

multipath OSPF

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ESR multipath 2-.

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Router 2, Router 3, Router 4 192.0.2.0/24 cost ESR. OSPF 16 multipath . 3 multipath :

```

ESR# show ip route
Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

O      * 192.0.2.0/24    [150/30]          multipath          [ospf1 02:33:15] (1.1.1.1)
        via 203.0.113.14 on gil/0/1.10 weight 1
        via 203.0.113.18 on gil/0/1.20 weight 1
        via 203.0.113.22 on gil/0/1.30 weight 1
  
```

ESR firewall:

```

ESR# show running-config
router ospf log-adjacency-changes
router ospf 1
  router-id 203.0.113.1
  area 0.0.0.0
    enable
  exit
enable
exit

interface gigabitethernet 1/0/1.10
  ip firewall disable
  ip address 203.0.113.13/30
  ip ospf instance 1
  ip ospf
exit
interface gigabitethernet 1/0/1.20
  ip firewall disable
  ip address 203.0.113.17/30
  ip ospf instance 1
  ip ospf
exit
interface gigabitethernet 1/0/1.30
  ip firewall disable
  ip address 203.0.113.21/30
  ip ospf instance 1
  ip ospf
exit

```

:

maximum-paths, 2, OSPF-. :

```

ESR# configure
ESR(config)# router ospf 1
ESR(config-ospf)# maximum-paths 2
ESR(config-ospf)# do commit
ESR(config-ospf)# do confirm
ESR(config-ospf)# end

```

2 multipath :

```

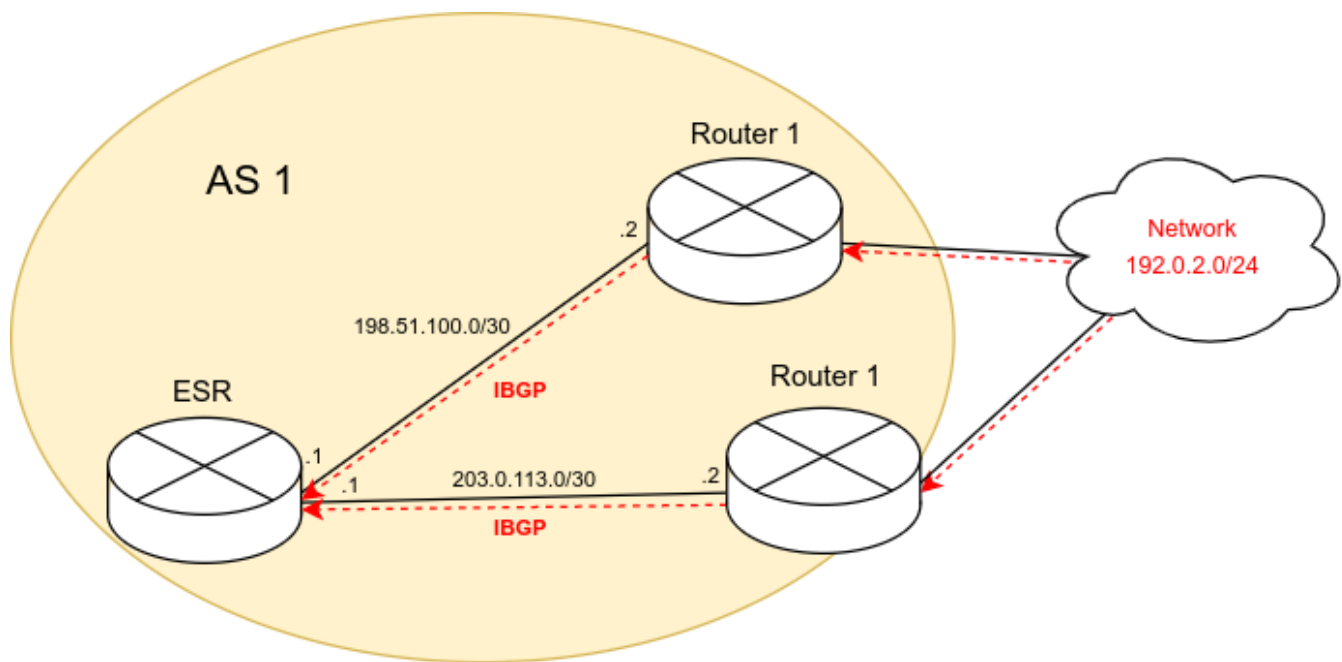
ESR# show ip route
Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

O      * 192.0.2.0/24    [150/30]                multipath                [ospf1 02:37:32] (1.1.1.1)
                                     via 203.0.113.14 on gil/0/1.10 weight 1
                                     via 203.0.113.18 on gil/0/1.20 weight 1

```

ECMP BGP

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ECMP 2 multipath .

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ESR, Router 1 Router 2 AS 1. Router 1 Router 2 192.0.2.0/24 cost ESR:

```
ESR# show bgp ipv4 unicast
Status codes: u - unicast, b - broadcast, m - multicast, a - anycast
               * - valid, > - best
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop          Metric  LocPrf  Weight Path
*> u 192.0.2.0/24    198.51.100.2    --      100     0     i
* u 192.0.2.0/24    203.0.113.2    --      100     0     i
```

multipath BGP (maximum-paths = 1), 1 192.0.2.0/24:

```
ESR# show ip route
Codes: C - connected, S - static, R - RIP derived,
       O - OSPF derived, IA - OSPF inter area route,
       E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
       B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - FIB route

B    * 192.0.2.0/24    [170/0]          via 198.51.100.2 on gil/0/1    [bgp1 04:03:09] (i)
C    * 198.51.100.0/30 [0/0]          dev gil/0/1                [direct 02:40:37]
C    * 203.0.113.0/30 [0/0]          dev gil/0/2                [direct 04:00:27]
```

firewall:

```

ESR# show running-config
router bgp log-neighbor-changes
router bgp 1
  router-id 198.51.100.1
  neighbor 198.51.100.2
    remote-as 1
    address-family ipv4 unicast
      enable
    exit
  enable
exit
neighbor 203.0.113.2
  remote-as 1
  address-family ipv4 unicast
    enable
  exit
  enable
exit
enable
exit

interface gigabitethernet 1/0/1
  ip firewall disable
  ip address 198.51.100.1/30
exit
interface gigabitethernet 1/0/2
  ip firewall disable
  ip address 203.0.113.1/30
exit

```

:

maximum-paths, 2, BGP-. :

```

ESR# configure
ESR(config)# router bgp maximum-paths 2
ESR(config)# do commit
ESR(config)# do confirm
ESR(config)# exit

```

2 multipath :

```

ESR# show ip route
Codes: C - connected, S - static, R - RIP derived,
        O - OSPF derived, IA - OSPF inter area route,
        E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
        B - BGP derived, D - DHCP derived, K - kernel route, V - VRRP route
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - FIB route

B      * 192.0.2.0/24    [170/0]                multipath                [bgp1 04:03:09]
                                     via 198.51.100.2 on gil/0/1 weight 1
                                     via 203.0.113.2 on gil/0/2 weight 1
C      * 198.51.100.0/30 [0/0]                dev gil/0/1                [direct 02:40:37]
C      * 203.0.113.0/30 [0/0]                dev gil/0/2                [direct 04:00:27]

```