4. Best path selection in multiple protocol environment with – RIPv2, EIGRP and OSPF

Dynamic routing protocol can decrease administrative overhead in large network environment. But what path will be selected for data traveling from point A to point B. Today published scenario will take closer look at path selection process in "academic" multi protocol environment.

Routing protocols that we can found in intra domain routing environment can be break down into two distinct category.

1. Distance vector routing protocols (RIPv1, Ripv2, IGRP, EIGRP) – advertisements about remote network are periodic, full or only affected parts of routing table (routing by rumor principe) – route is propagated as "route sign" network "198.120.24.0/24" and path to "serial0/1/0 or next hop 198.20.0.4/30".

2. Link state routing protocols (OSPF, IS IS) – after link state data flooding at startup or after trigger (change in network environment) is created independently in appropriate router full network topology (OSPF use Edgar Dijkstra Shortest path first algorithm for it).

Routing protocols use for path selection and their next routing table introduction their own mechanism for metric marking. Our lab use 3 networking protocol, but to routing table are introduced only route with minimal Administrative Distance AD (say about trustworthiness appropriate routing protocol -. RIP 120, EIGRP internal route 90 and OSPF 110). Please if you will see route from intended routing protocol configure in testing environment routing protocols in this manner: a) **RIPv 2 routing** – and examine path selection – it will be with minimal hop count Branch to central

b) **OSPF routing** – minimal bandwidth is preferred – in our scenario are two equal path possible Branch – A - B – Central or Branch – X - Y – Central

c) **EIGRP routing** (cisco proprietary with maximum trustworthiness) – composite metric (default bandwidth and delay are used for calculation) will also cost load balancing between two mentioned path

Preconfigured scenario in cisco packet tracer 5.2 or above is here. Topology for testing scenario is



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Output from **#show ip route** on Branch router with EIGRP route introduced in routing table }as mentioned earlier because this routing protocol has minimal AD 90 can be assumed as more trustworthy].

```
Router#show ip route Branch router
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
i - IS-IS, 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
Gateway of last resort is 10.1.1.2 to network 0.0.0.0
     10.0.0/30 is subnetted, 4 subnets
С
        10.1.1.0 is directly connected, Serial0/0/0
С
        10.1.1.4 is directly connected, Serial0/0/1
D
        10.2.2.0 [90/3193856] via 10.1.1.2, 00:29:04, Serial0/0/0
D
        10.2.2.4 [90/3193856] via 10.1.1.6, 00:29:05, Serial0/0/1
    172.16.0.0/30 is subnetted, 3 subnets
D
       172.16.1.0 [90/2681856] via 10.1.1.2, 00:29:06, Serial0/0/0
С
        172.16.2.0 is directly connected, Serial0/1/1
D
        172.16.3.0 [90/2681856] via 10.1.1.6, 00:29:05, Serial0/0/1
С
    192.168.1.0/24 is directly connected, FastEthernet0/0
D
    192.168.2.0/24 [90/3705856] via 10.1.1.6, 00:29:04, Serial0/0/1
                    [90/3705856] via 10.1.1.2, 00:29:04, Serial0/0/0
O*E2 0.0.0.0/0 [110/1] via 10.1.1.2, 00:28:43, Serial0/0/0
                                                                 two eual pathh to
               [110/1] via 10.1.1.6, 00:28:43, Serial0/0/1
                                                                 network on Central
Router#
                                                                 router
```

Short look at Branch router interfaces and routing protocols config follow

```
interface FastEthernet0/0
ip address 192.168.1.254 255.255.255.0
duplex auto
speed auto
T.
interface FastEthernet0/1
no ip address
duplex auto
speed auto
shutdown
T.
                      Bandwidth command is esential for routing
interface Serial0/0/0
bandwidth 2000000 protocol path selection but not affect real bw
ip address 10.1.1.1 255.255.255.252
T.
interface Serial0/0/1
bandwidth 2000000
ip address 10.1.1.5 255.255.255.252
T
interface Serial0/1/0
no ip address
shutdown
I.
interface Serial0/1/1
bandwidth 64
                  64kb/s
ip address 172.16.2.1 255.255.255.252
clock rate 64000
T
interface Vlan1
no ip address
shutdown
T
router eigrp 1
passive-interface FastEthernet0/0 network is adwertised but will not receive
network 192.168.1.0
                                    routing advert.
network 10.1.1.0 0.0.0.3
network 10.1.1.4 0.0.0.3
network 172.16.2.0 0.0.0.3
no auto-summary auto-summary at routing boundary was supressed
1
router ospf 1
log-adjacency-changes
passive-interface FastEthernet0/0
network 192.168.1.0 0.0.0.255 area 0
network 10.1.1.0 0.0.0.3 area 0
network 10.1.1.4 0.0.0.3 area 0
network 172.16.2.0 0.0.0.3 area 0 single area ospf is used
T
router rip
version 2
passive-interface FastEthernet0/0
network 10.0.0.0
network 172.16.0.0
network 192.168.1.0
no auto-summary
T
ip classless
```