

# 16. Administrative Distance and route source preference

*In environment with 2 or more enabled routing protocols must be present mechanism for selection of routing sources that are learned.* What routing protocol obtained routes for remote network will be introduced to routers routing table? That is a big question.

**Administrative Distance** in short AD is considered *parameter that will break the tie and say about trustworthiness of routing source.*

Table of administrative distance of routing protocols

<b>Routing source</b>	<b>AD (administrative distance)</b>
connected	0
static	1
EIGRP summary route	5
External BGP	20
Internal EIGRP	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
External EIGRP	170

<b>Routing source</b>	<b>AD (administrative distance)</b>
Internal BGP	200

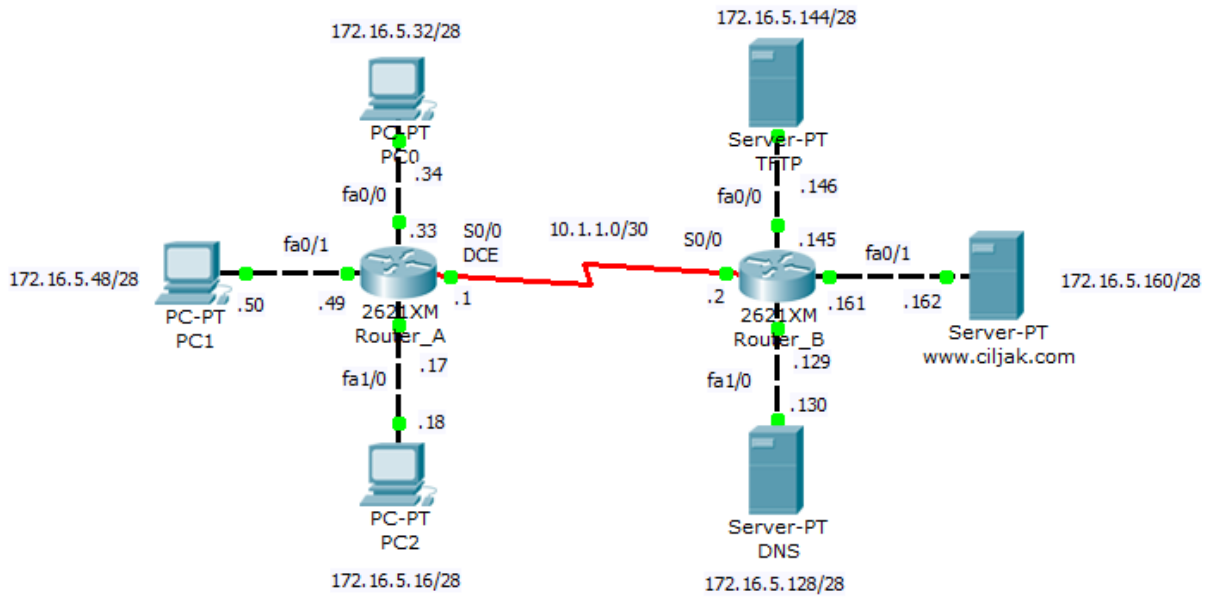
Say in other words – **AD is number from interval <0, 255>**. And **lower is better** that mean static route (AD=1) is preferred over OSPF learned route (AD=110).

Training scenario focus on introduction routing sources (learned route) from RIP, EIGRP and OSPF routing protocols.

Fully configured lab. scenario for Cisco Packet Tracer 5.2 or above can be [obtained from here](#). Topology diagram show next picture.

Which routing protocol would be used to route packets to 172.16.5.48/28?

```
Configured: RIPv2
             EIGRP 100 with auto-summary
             OSPF 100
```



Routing protocols configuration is

Router\_A

Router\_B

```
router eigrp 100
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
network 172.16.5.0 0.0.0.63
network 10.1.1.0 0.0.0.3
  auto-summary
  !
router ospf 100
log-adjacency-changes
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
network 172.16.5.0 0.0.0.63
  area 0
network 10.1.1.0 0.0.0.3 area
  0
  !
router rip
  version 2
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
  network 10.0.0.0
  network 172.16.0.0
  !
ip classless
```

```
router eigrp 100
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
network 172.16.5.128 0.0.0.63
network 10.1.1.0 0.0.0.3
  auto-summary
  !
router ospf 100
log-adjacency-changes
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
network 172.16.5.128 0.0.0.63
  area 0
network 10.1.1.0 0.0.0.3 area
  0
  !
router rip
  version 2
  passive-interface
  FastEthernet0/0
  passive-interface
  FastEthernet0/1
  passive-interface
  FastEthernet1/0
  network 10.0.0.0
  network 172.16.0.0
  !
ip classless
```

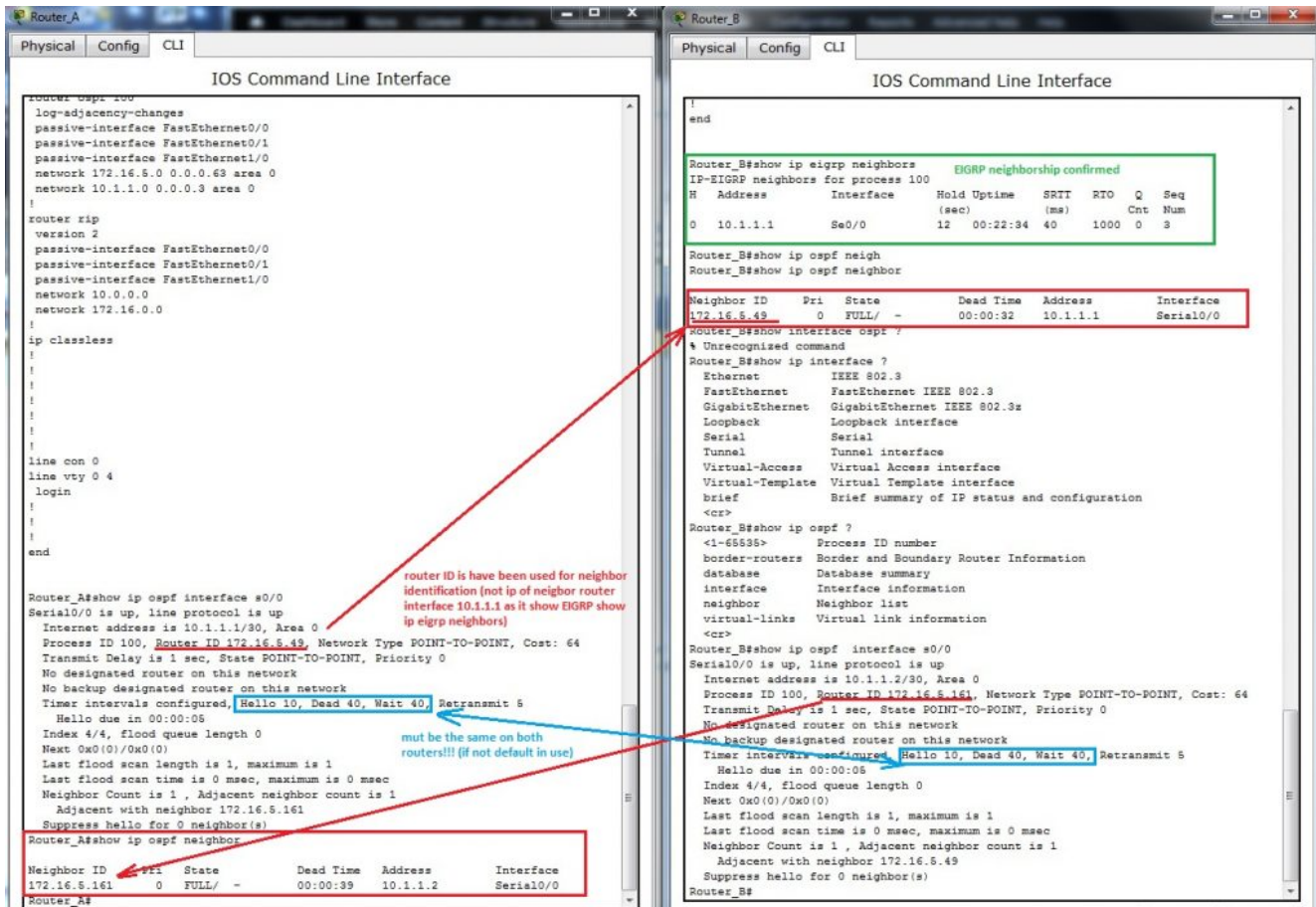
EIGRP and OSPF routing protocols will create neighborship relation between facing interfaces. This mechanism is important for generate triggers after breaking relationship after topology change in network and cause generating and spreading routing protocols PDU, algorithm recalculation and rearrangement in routing table.

If routing table is missing expected route please take a look at creation of neighbor relation and verify appropriate timers that trigger sending hello packet or define time for detaching route from table after their potential error.

*Important commands for troubleshooting at CCNA level are:*

- `show ip eigrp neighbors`
- `show ip ospf neighbor`
- `show ip ospf interface INTERFACE`
- `show ip route`
- `show ip protocols`

Output from neighborship verification commands are

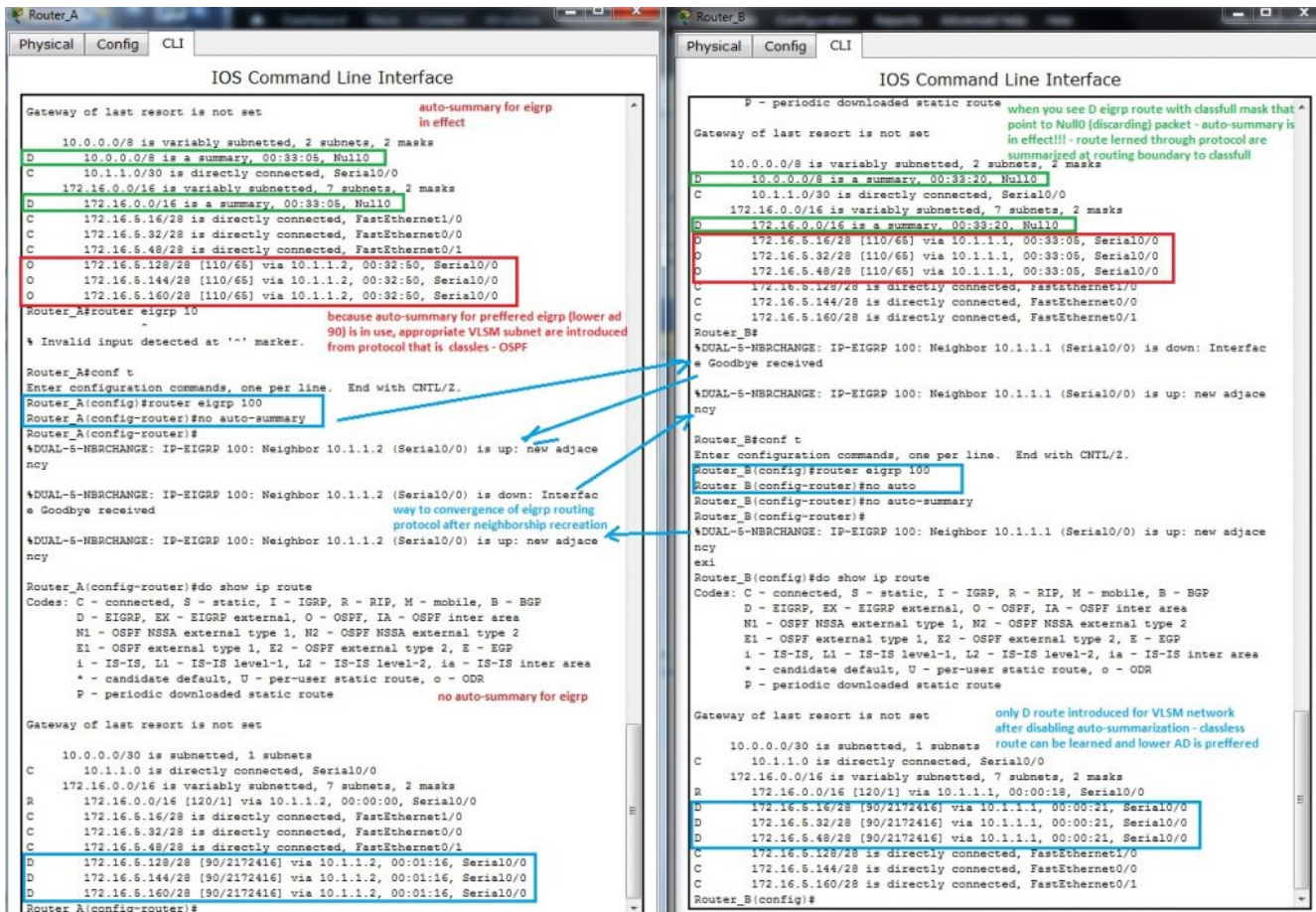


Now we can look at routing table both router A and B. What we can expect? Which routing protocol introduce their route to routing table? Lower AD is preferred and lowest AD has EIGRP!

But what is wrong, routing table show only classfull D (Dual EIGRP route) that point nowhere (Null0)? Can you mentally answer why it is so? What is wrong in our config? Classless VLSM route (network mask is longer as appropriate classfull mask) are introduced by OSPF because OSPF is inherently classless routing protocol.

Please remember that **null0** classfull route introduced to routing table by EIGRP protocol (leading D for that route) is because **auto-summary** was not suppressed and is in use. For correcting this behavior on our network we must type **no auto-summary** on router-config command prompt of router eigrp 100.

All that was we describe is recorded from output of CLI Router\_A and Router\_B on next picture.



One of many processes that run on our router is mapping L3 address to L2 mac address on Ethernet interfaces. Info about learned relationship between L3 and L2 address offer ARP table of router. Their output can be visible after typing show arp on privileged exec of CLI (output depend on previews communication, arp cache is dynamic table that is aged after appropriate time non use of connection. That mean, if you will have all mac in table you must make ping sweep).

```
Router_A#show arp
Protocol Address           Age (min) Hardware Addr  Type   Interface
Internet 172.16.5.17            -    0060.7038.CD01  ARPA   FastEthernet1/0
Internet 172.16.5.18            2    0090.2193.645C  ARPA   FastEthernet1/0
Internet 172.16.5.33            -    000C.85D9.5D01  ARPA   FastEthernet0/0
Internet 172.16.5.34            3    00D0.BAE7.3634  ARPA   FastEthernet0/0
Internet 172.16.5.49            -    000C.85D9.5D02  ARPA   FastEthernet0/1
Internet 172.16.5.50            2    0090.0C1B.3E57  ARPA   FastEthernet0/1
```

Records with character – in Age column is local interface of device. These records are excluded from aging mechanism! (- mean local interface on device, other are learned through ARP protocol)