Computer Networks

Lab 2

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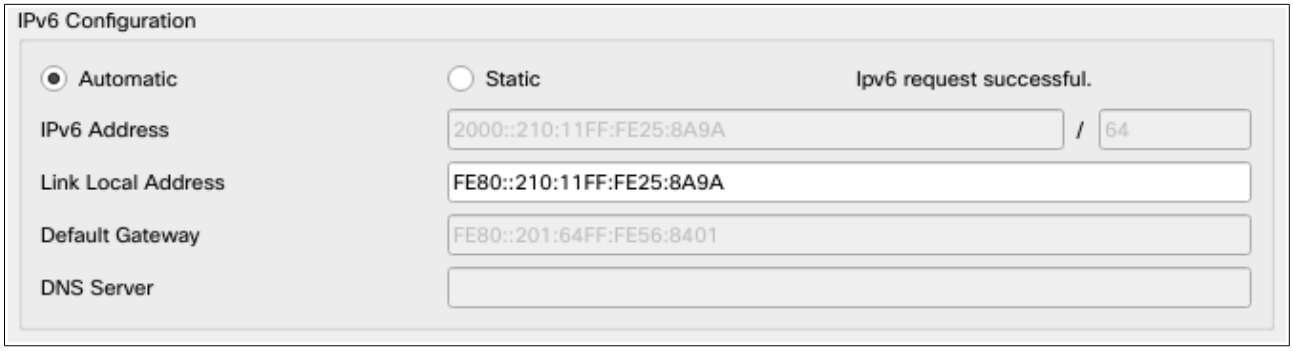
Part 1 : IPv6

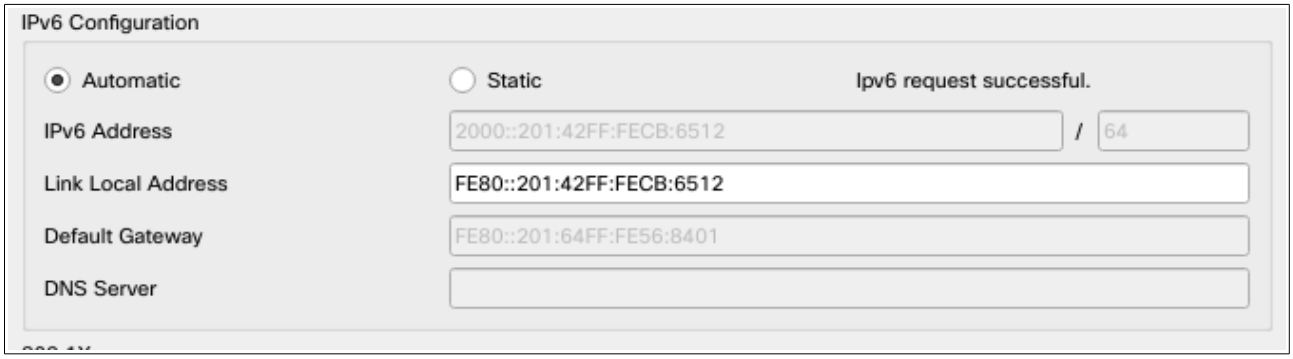
Q1.1 : What is the advantage of disabling DNS lookup ?
In privilege EXEC mode, if you type in something other than a Cisco IOS command, the router assumes that you typed a domain name and it tries to resolve what ever you type.
The router becomes irresponsive for about 5-6 seconds trying to resolve the name.

Q1.2 Why do we obtain two addresses for one interface?
There is a unicast address (2000) and a link local address (fe80)

sales



Accounting



Q1.3 For the following steps, show and comment the different modifications

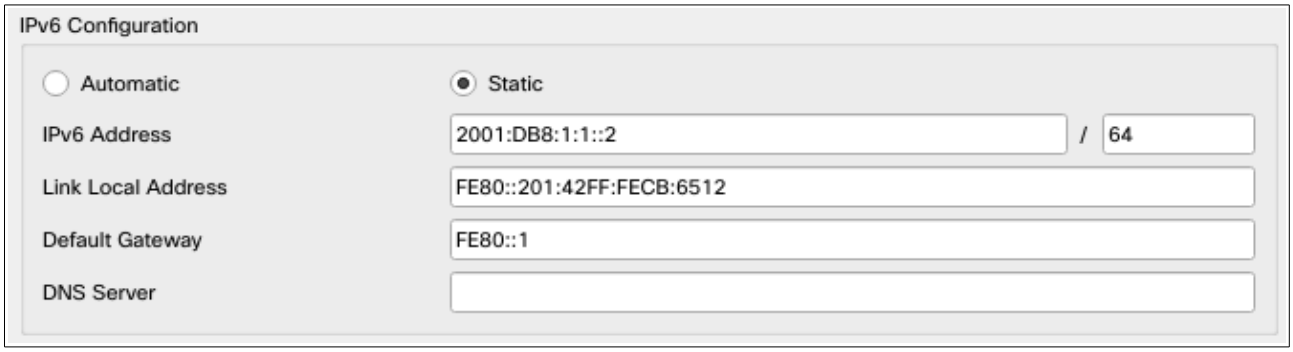
```
Router#show ipv6 interface brief
FastEthernet0/0          [up/up]
    FE80::1
    2000::1
    2001:DB8:1:1::1
FastEthernet0/1          [up/up]
    unassigned
Vlan1                    [administratively down/down]
    unassigned
Router#
```

we have a unicast and a link-local address for interface 0/0.
the third address is, as i found, an address used for documentation and exemples.

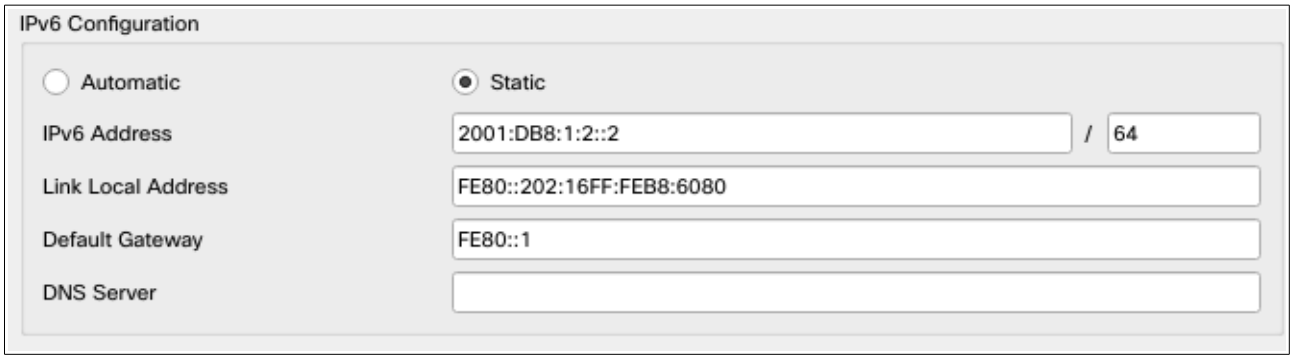
```
Router#show ipv6 interface f0/1
FastEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::1
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:1:2::1, subnet is 2001:DB8:1:2::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:1
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 (unspecified)
  ND advertised retransmit interval is 0 (unspecified)
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
Router#
```

We have multicast addresses

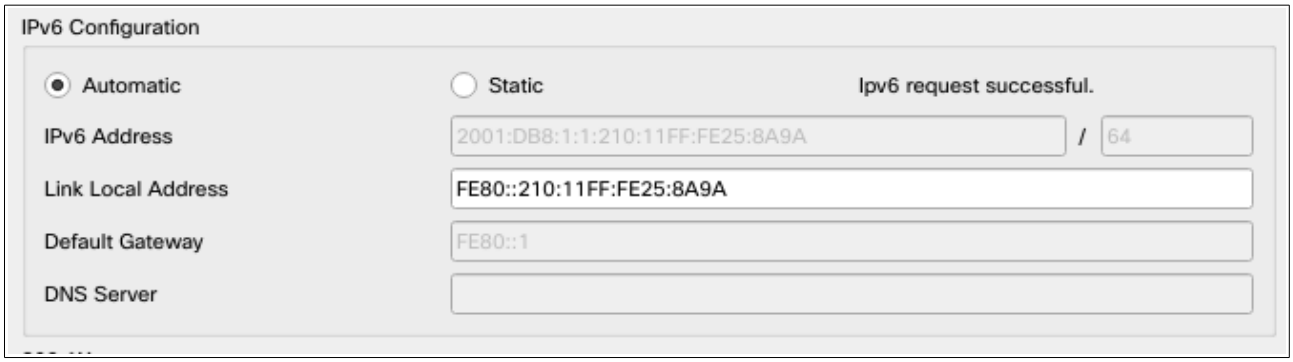
Configure IPv6 addressing on the Accounting Server.
Accounting :



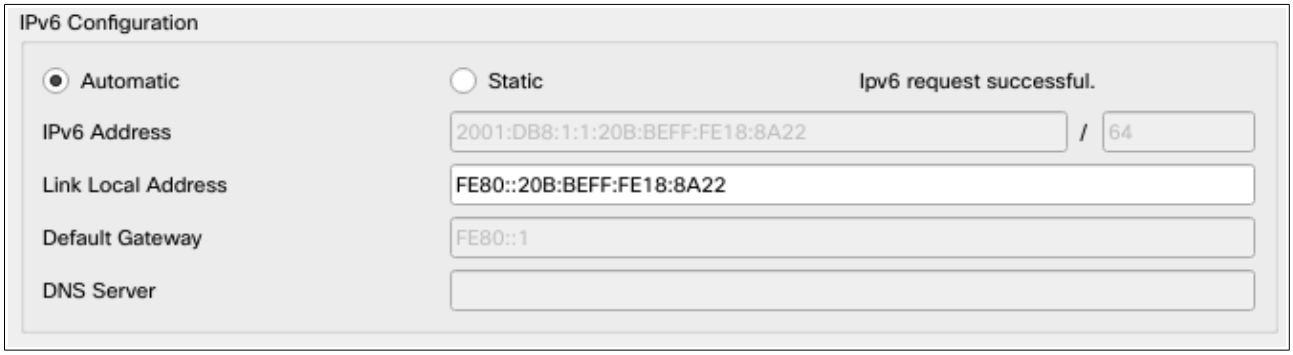
Configure IPv6 addressing on the CAD Server
CAD serveur :



Configure IPv6 addressing on the Sales and Billing Client
Sales :

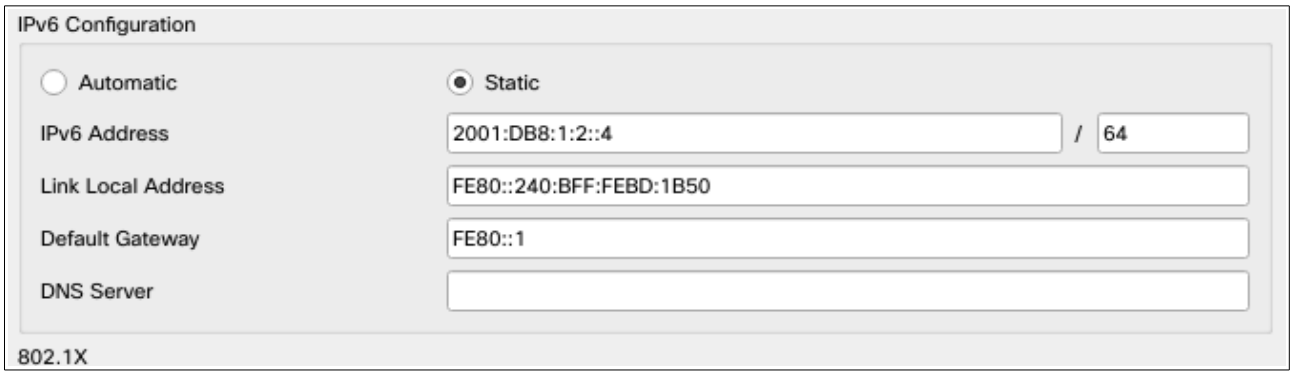


Billing :

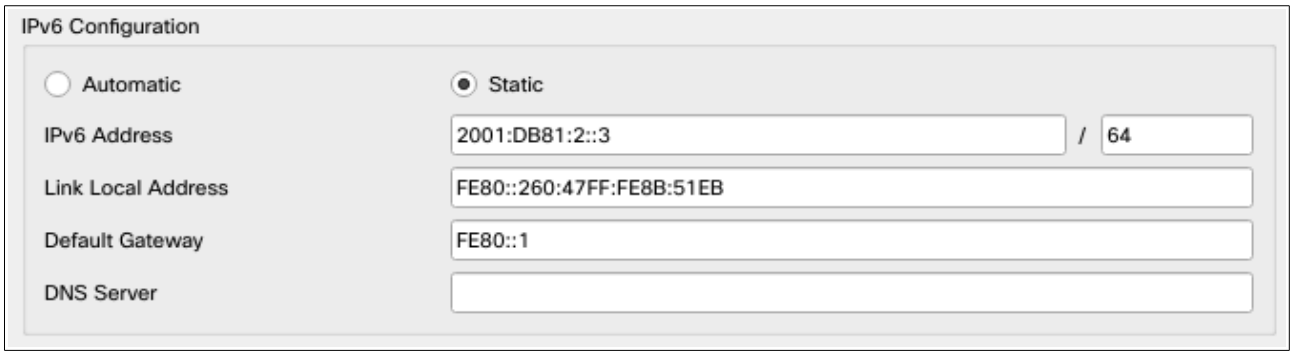


Q.1.4 What is the IPv6 address obtained by Auto Config ? the autoconfiguration is it stateless or stateful ?
It's a global unicast address.
The autoconfiguration is stateless because it requires no manual configuration of hosts, minimal configuration of routers, and no additional servers.

Configure IPv6 Addressing on the Engineering and Design Clients.
Engineering

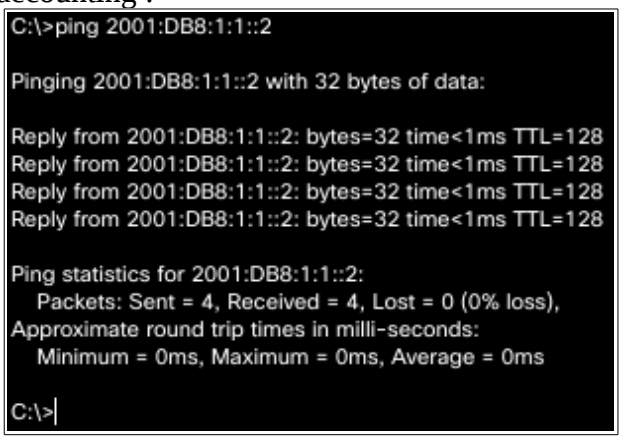


Design :

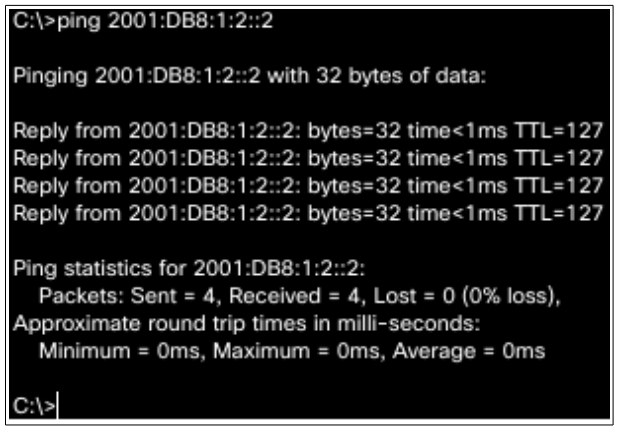


Ping and Traceroute the server from the clients

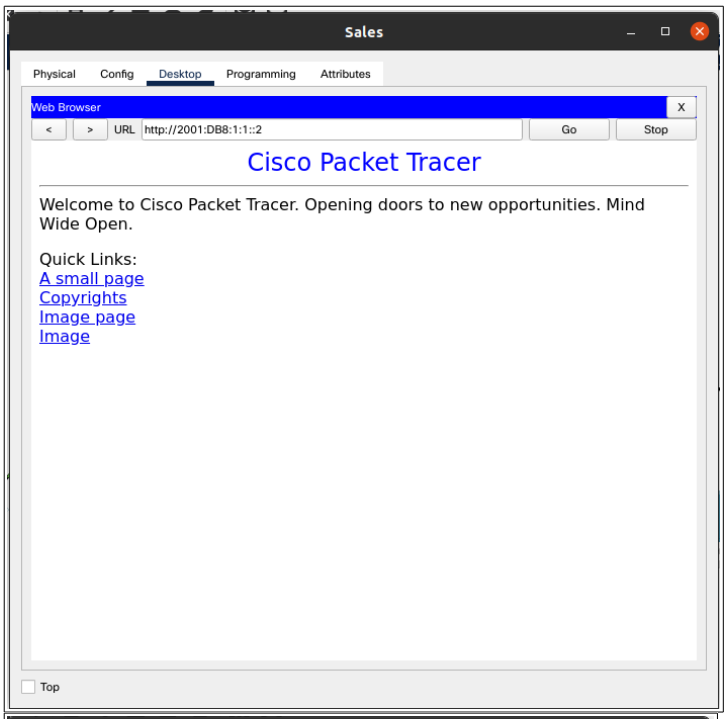
accounting :

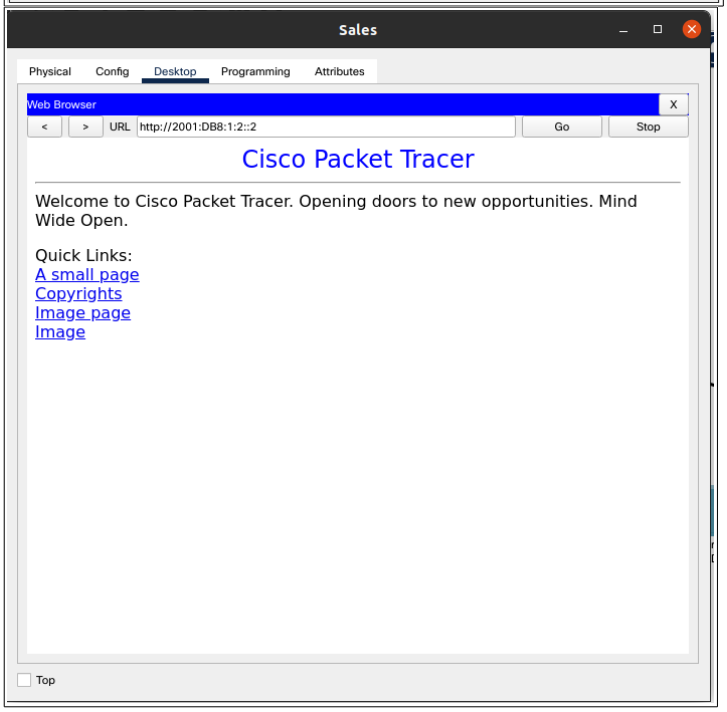


cad :



Open the server web pages from the clients





Q1.5 Compare the two techniques static and autoconfiguration IPv6 addressing, advantages and drawbacks.

The autoconfiguration is easy and convenient to use but the router advertisements do not provide the hosts with all of the network configuration that it may need.

Part 2: Dynamic Routing (EIGRP)

Q2.1) the loopback is an interface on the router 2. when data is send to that interface, it is send back to the sender. It can be used for testing.

Q2.2)
#en
#config t
#interface fatsEthernet f0/0
#ip address 192.168.10.5 255.255.255.252
#no shutdown

Q2.3)

```
R1>show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        172.16.1.1      YES manual up                    up
FastEthernet1/0        unassigned      YES unset  administratively down down
Serial2/0              192.168.10.5    YES manual up                    up
Serial3/0              172.16.3.1      YES manual up                    up
FastEthernet4/0        unassigned      YES unset  administratively down down
FastEthernet5/0        unassigned      YES unset  administratively down down
R1>
```

```
R2>sh ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        172.16.2.1      YES manual up                    up
FastEthernet1/0        unassigned      YES unset  administratively down down
Serial2/0              172.16.3.2      YES manual up                    up
Serial3/0              192.168.10.9    YES manual up                    up
FastEthernet4/0        unassigned      YES unset  administratively down down
FastEthernet5/0        unassigned      YES unset  administratively down down
Loopback1              10.1.1.1        YES manual up                    up
```

```
R3>sh ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.1.1     YES manual up                    up
FastEthernet1/0        unassigned      YES unset  administratively down down
Serial2/0              192.168.10.6    YES manual up                    up
Serial3/0              192.168.10.10   YES manual up                    up
FastEthernet4/0        unassigned      YES unset  administratively down down
FastEthernet5/0        unassigned      YES unset  administratively down down
R3>
```

Q2.4) no we can’t because we did’nt configure the routing table yet

Q2.5) Serial 2/0

Q2.6)
#router eigrp 1
#network 192.168.1.0
#network 192.168.10.4 0.0.0.3
#network 192.168.10.8 0.0.0.3

Q2.7)

R1 :

```
    172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D      172.16.0.0/16 is a summary, 00:07:07, Null0
C      172.16.1.0/24 is directly connected, FastEthernet0/0
D      172.16.2.0/24 [90/20514560] via 172.16.3.2, 00:07:07, Serial3/0
C      172.16.3.0/30 is directly connected, Serial3/0
    192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D      192.168.10.0/24 is a summary, 00:07:07, Null0
C      192.168.10.4/30 is directly connected, Serial2/0
D      192.168.10.8/30 [90/21024000] via 192.168.10.6, 00:01:56, Serial2/0
```

R2 :

```
    10.0.0.0/30 is subnetted, 1 subnets
C      10.1.1.0 is directly connected, Loopback1
    172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D      172.16.0.0/16 is a summary, 00:08:10, Null0
D      172.16.1.0/24 [90/20514560] via 172.16.3.1, 00:08:07, Serial2/0
C      172.16.2.0/24 is directly connected, FastEthernet0/0
C      172.16.3.0/30 is directly connected, Serial2/0
    192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D      192.168.10.0/24 is a summary, 00:08:10, Null0
D      192.168.10.4/30 [90/21024000] via 192.168.10.10, 00:02:56, Serial3/0
C      192.168.10.8/30 is directly connected, Serial3/0
```

R3 :

```
D    172.16.0.0/16 [90/20514560] via 192.168.10.9, 00:00:30, Serial3/0
                   [90/20514560] via 192.168.10.5, 00:00:24, Serial2/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
    192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D      192.168.10.0/24 is a summary, 00:00:30, Null0
C      192.168.10.4/30 is directly connected, Serial2/0
C      192.168.10.8/30 is directly connected, Serial3/0
```

Q2.8)

```
R1>sh ip protocols

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
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
Redistributing: eigrp 1
  Automatic network summarization is in effect
  Automatic address summarization:
    172.16.0.0/16 for Serial2/0
      Summarizing with metric 28160
    192.168.10.0/24 for FastEthernet0/0, Serial3/0
      Summarizing with metric 20512000
  Maximum path: 4
  Routing for Networks:
    172.16.0.0
    192.168.10.4/30
  Routing Information Sources:
    Gateway         Distance      Last Update
    172.16.3.2      90            8684
    192.168.10.6    90            312497
  Distance: internal 90 external 170
```

Q2.9)
Thanks to eigrp all routes are in routing tables, using the shortest way.

```
C:\>ping 172.16.2.10

Pinging 172.16.2.10 with 32 bytes of data:

Reply from 172.16.2.10: bytes=32 time=1ms TTL=126
Reply from 172.16.2.10: bytes=32 time=1ms TTL=126
Reply from 172.16.2.10: bytes=32 time=1ms TTL=126
Reply from 172.16.2.10: bytes=32 time=1ms TTL=126

Ping statistics for 172.16.2.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>ping 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:

Reply from 192.168.1.10: bytes=32 time=6ms TTL=126
Reply from 192.168.1.10: bytes=32 time=1ms TTL=125
Reply from 192.168.1.10: bytes=32 time=1ms TTL=126
Reply from 192.168.1.10: bytes=32 time=1ms TTL=125

Ping statistics for 192.168.1.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 6ms, Average = 2ms

C:\>
```

Q2.10)
BW : La bande passante,
load : La Charge,
DLY : Le Délais,
reliability : La Fiabilité.

Q2.11) with : #show ip protocols
we get : EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
K1 is for bandwidth

Q2.12)
exemple of commande for R1 ↔ R3
R1#(config) interface serial 2/0
R1#(config-if) bandwitch 64

R3#(config) interface serial 2/0
R3#(config-if) bandwitch 64

Q2.13)

```
R1>show interface serial 2/0
Serial2/0 is up, line protocol is up (connected)
  Hardware is HD64570
  Internet address is 192.168.10.5/30
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
```

Q2.14)

```
R1>show ip eigrp topology
IP-EIGRP Topology Table for AS 1/ID(192.168.10.5)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 172.16.0.0/16, 1 successors, FD is 28160
        via Summary (28160/0), Null0
P 172.16.1.0/24, 1 successors, FD is 28160
        via Connected, FastEthernet0/0
P 172.16.2.0/24, 1 successors, FD is 3014400
        via 172.16.3.2 (3014400/28160), Serial3/0
P 172.16.3.0/30, 1 successors, FD is 3011840
        via Connected, Serial3/0
P 192.168.1.0/24, 1 successors, FD is 3526400
        via 172.16.3.2 (3526400/3014400), Serial3/0
        via 192.168.10.6 (40514560/28160), Serial2/0
P 192.168.10.0/24, 1 successors, FD is 40512000
        via Summary (40512000/0), Null0
P 192.168.10.4/30, 1 successors, FD is 40512000
        via Connected, Serial2/0
P 192.168.10.8/30, 1 successors, FD is 41024000
        via 192.168.10.6 (41024000/3011840), Serial2/0
R1>
```

```
    172.16.0.0/16 is variably subnetted, 4 subnets, 3 masks
D       172.16.0.0/16 is a summary, 00:03:10, Null0
C       172.16.1.0/24 is directly connected, FastEthernet0/0
D       172.16.2.0/24 [90/3014400] via 172.16.3.2, 00:05:08, Serial3/0
C       172.16.3.0/30 is directly connected, Serial3/0
D    192.168.1.0/24 [90/3526400] via 172.16.3.2, 00:04:21, Serial3/0
    192.168.10.0/24 is variably subnetted, 3 subnets, 2 masks
D       192.168.10.0/24 is a summary, 00:03:10, Null0
C       192.168.10.4/30 is directly connected, Serial2/0
D       192.168.10.8/30 [90/41024000] via 192.168.10.6, 00:03:09, Serial2/0
```

Q2.15) there are two paths.
The best path is via 172.16.3.2 (3526400)

Q2.16) simulating the transmittion of IMCP messages from PC1 to PC3, messages goes by R1 → R2 → R3

Q2.17) #(config) no enable password

Part 3: VLAN and Spanning Tree

Q3.1 How to disable DNS lookup? Give the command line.
no ip domain-lookup

Q3.2 Comment the obtained result of "show vlan" command line. Use "brief" to reduce the given information.

```
Switch>sh vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch>
```

All ports are assigned to VLAN 1

Q3.3 List the possible switchport modes of a Cisco switch. Give the difference between these modes.
Acces : for end user devices
Trunk : for switch to switch

Q3.4 Configure the mode access on the interface fa 0/3 of S1 and fa0/3, fa0/4, fa0/5 for S2

```
Switch>sh interfaces fastEthernet 0/3 switchPort
Name: Fa0/3
Switchport: Enabled
Administrative Mode: static access
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: Off
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
```

Q3.5 How to enable trunk mode for all interfaces Fa0/1 et Fa0/2 of each switch: S1 S2 and S3 ?
#interface range fa0/1, fa0/2
#switchport mode trunk
#no shutdown

Q3.6 Verify that the switches are correctly configured by pinging between them. From S1, ping the management interface on S2 and S3. From S2, ping the management interface on S3. Comment the obtained result.
Success rate is 100 % or 60 %

Q3.7 Verify the creation of the VLAN via "show vlan brief" command line.

```
Switch>sh vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/21, Fa0/22, Fa0/23, Fa0/24
10   finance                           active    Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                 Fa0/20
20   staff                             active    Fa0/3
30   guest                             active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                 Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                 Fa0/12, Fa0/13, Fa0/14, Fa0/15
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
```

Q3.8 Ping from PC3 the PC1, PC2 and PC4. Comment the obtained result.
Pc3 can ping only pc 2, because he's on the same vlan « gest ».
pc1 is on vlan « staff », pc4 is on another switch, witch has only default vlan.

Q3.9 Use the command "show vlan status" on S2. What is the maximum number of supported VLANs?
Maximum VLANs supported locally : 255.

Q3.10 What is the vtp mode by default on the switches?
The default vtp mode is server

Q3.11 Set the name of VTP domain and password of S2

Q3.12 change the vtp mode for S1 to client, with the same domain and password of the server, then report the command line.
S1(config)#vtp domain My-office
S1(config)#vtp password cisco
S1(config)#vtp mode client

Q3.13 Try to create a new vlan on the S2. Is it possible? Explain.
It is possible because there is 4 interface left not used for a vlan (fa0/21-24)

Q3.14 Now use the commands “show vtp status” and “show vlan brief” to ensure that the VLAN configuration is the same for S1 and S2. Do the same for the switch S3.

```
Switch>sh vtp status
VTP Version                     : 2
Configuration Revision          : 2
Maximum VLANs supported locally : 255
Number of existing VLANs        : 9
VTP Operating Mode              : Server
VTP Domain Name                 : My-office
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0xCD 0x9A 0x57 0x15 0xDA 0xF7 0x43 0x85
Configuration last modified by 172.17.10.2 at 3-1-93 00:17:51
Local updater ID is 172.17.10.2 on interface Vl1 (lowest numbered VLAN interface found)
Switch>sh vlan brief

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active
10   finance                           active    Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                 Fa0/20
20   staff                             active    Fa0/3
30   guest                             active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                 Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                 Fa0/12, Fa0/13, Fa0/14, Fa0/15
40   test                              active    Fa0/21, Fa0/22, Fa0/23, Fa0/24
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
Switch>
```

Q3.15 Report the Bridge ID Priority and explain the obtained numbers.

S1 => Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)
S2 => Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)
S3 => Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)

The root bridge of the spanning tree is the bridge with the smallest bridge ID priority.

Q3.16 Identify the root bridge switch for each vlan; why a particular switch is selected the root bridge?

Vlan 10 => S2
Vlan 20 => S2
Vlan 30 => S2
a switch is elected based on it’s priority. It is the more efficient / secure.

Q3.17 Change the root bridge for vlan 20 to be one of the other switches. Give the related command.

S3(config)#spanning-tree vlan <vlanId> root primary

Q3.18 Find designated Ports, Root Ports, Blocked Ports on each switch.

#show spanning-tree detail

```
Switch#show spanning-tree detail

VLAN0001 is executing the ieee compatible Spanning Tree Protocol
  Bridge Identifier has priority of 32768, sysid 1, 0001.C944.E610
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 32769
  Root port is 2 (FastEthernet0/2), cost of root path is 19
  Topology change flag not set, detected flag not set
  Number of topology changes 0 last change occurred 00:00:00 ago
                          from FastEthernet0/1
  Times:  hold 1, topology change 35, notification 2
                                     hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0, aging 300

Port 1 (FastEthernet0/1) of VLAN0001 is designated forwarding
  Port path cost 19, Port priority 128, Port Identifier 128.1
  Designated root has priority 32769, address 0001.C749.B9AA
  Designated bridge has priority 32769, address 0001.C944.E610
  Designated port id is 128.1, designated path cost 19
  Timers: message age 16, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  Link type is point-to-point by default

Port 2 (FastEthernet0/2) of VLAN0001 is root forwarding
  Port path cost 19, Port priority 128, Port Identifier 128.2
  Designated root has priority 32769, address 0001.C749.B9AA
  Designated bridge has priority 32769, address 0001.C749.B9AA
 --More--
```