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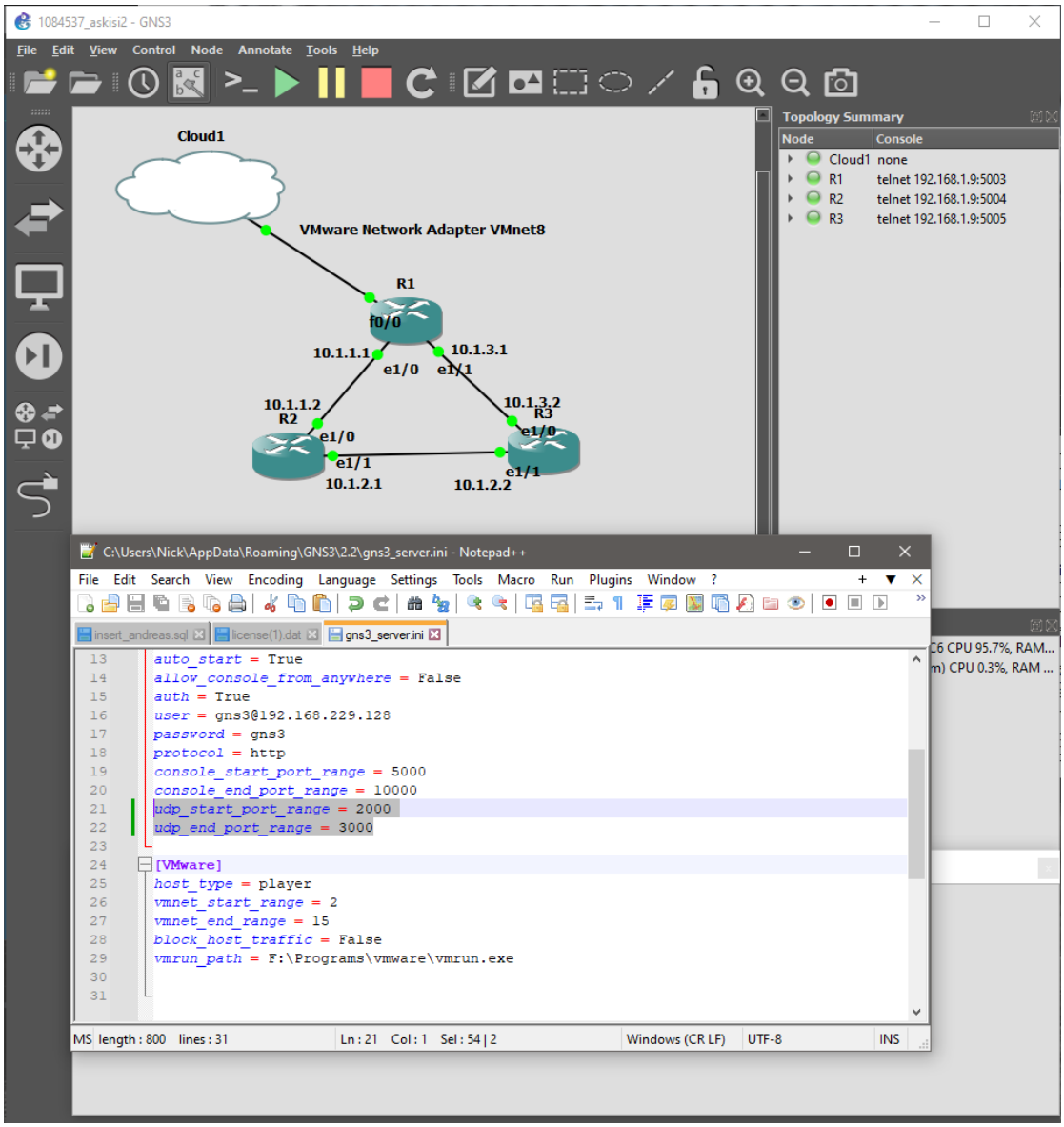
**ΜΕΡΟΣ Α**

Προεργασία: Φτιαχνω την τοπολογια όπως υποδυκνυεται από την εκφωνηση. Λογω καποιας παρεμβολης του gns3 με το Nvidia GeForce Experience χρειάστηκε να κάνω τις παρακάτω αλλαγές στο gns3_server.ini που βρισκεται στον %appdata% φακελο συστήματος. (Το error αφορουσε το dynamips και δεν μου φορτωνε το .gns3project μου)



1)Αναθέτω στα R1 τις ip 10.1.1.1 και 10.1.3.1:

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int e1/0
R1(config-if)#ip add 10.1.1.1 255.255.255.0
R1(config-if)#int loop 0
R1(config-if)#ip
*Mar 10 10:45:03.463: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R1(config-if)#ip add 1.1.1.1 255.255.255.255
R1(config-if)#end
```

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int e1/1
R1(config-if)#ip add 10.1.3.1 255.255.255.0
R1(config-if)#^Z
R1#
```

R2 τις ip 10.1.1.2 και 10.1.2.1:

```
R2#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#int e1/0
R2(config-if)#no shut
R2(config-if)#
*Mar 10 10:51:24.207: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Mar 10 10:51:25.207: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R2(config-if)#ip add 10.1.1.2 255.255.255.0
R2(config-if)#int loop0
R2(config-if)#
*Mar 10 10:52:06.703: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R2(config-if)#ip add 2.2.2.2 255.255.255.255
```

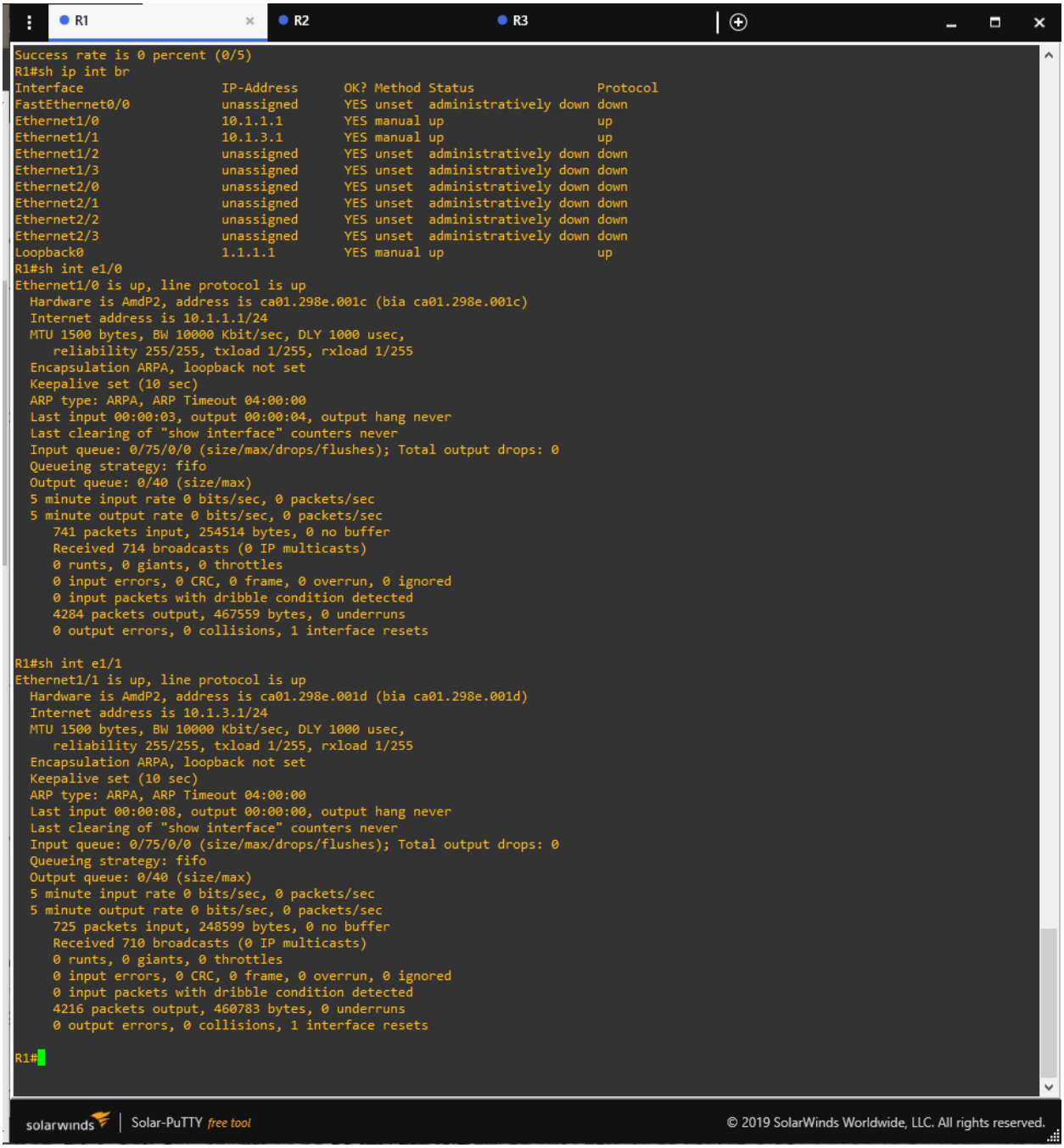
```
R2(config)#int e1/1
R2(config-if)#ip add 10.1.2.1 255.255.255.0
R2(config-if)#^Z
```

R3 τις ip 10.1.3.2 και 10.1.2.2

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#int e1/0
R3(config-if)#no shut
R3(config-if)#ip
*Mar 10 10:59:39.543: %LINK-3-UPDOWN: Interface Ethernet1/0, changed state to up
*Mar 10 10:59:40.543: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet1/0, changed state to up
R3(config-if)#ip add 10.1.1.3 255.255.255.0
R3(config-if)#int loop 0
R3(config-if)#
*Mar 10 10:59:59.871: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R3(config-if)#ip add 3.3.3.3 255.255.255.255
R3(config-if)#^Z
```

```
R3(config)#int e1/1
R3(config-if)#ip add 10.1.2.2 255.255.255.0
R3(config-if)#^Z
R3#
```

Εκτελώ sh int br και sh int για e1/1 και e1/0 για το R1:



Εκτελώ sh int br και sh int για e1/1 και e1/0 για το R2:

Εκτελώ sh int br και sh int για e1/1 και e1/0 για το R3:

```
R3#sh ip int br
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            unassigned      YES unset  administratively down down
Ethernet1/0                10.1.3.2        YES manual up                    up
Ethernet1/1                10.1.2.2        YES manual up                    up
Ethernet1/2                unassigned      YES unset  administratively down down
Ethernet1/3                unassigned      YES unset  administratively down down
Ethernet2/0                unassigned      YES unset  administratively down down
Ethernet2/1                unassigned      YES unset  administratively down down
Ethernet2/2                unassigned      YES unset  administratively down down
Ethernet2/3                unassigned      YES unset  administratively down down
Loopback0                  3.3.3.3         YES manual up                    up
R3#sh int e1/0
Ethernet1/0 is up, line protocol is up
  Hardware is AmdP2, address is ca03.29ce.001c (bia ca03.29ce.001c)
  Internet address is 10.1.3.2/24
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:04, output 00:00:08, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     716 packets input, 248540 bytes, 0 no buffer
     Received 702 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 input packets with dribble condition detected
     4186 packets output, 456577 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets

R3#sh int e1/1
Ethernet1/1 is up, line protocol is up
  Hardware is AmdP2, address is ca03.29ce.001d (bia ca03.29ce.001d)
  Internet address is 10.1.2.2/24
  MTU 1500 bytes, BW 10000 Kbit/sec, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:41, output 00:00:05, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     729 packets input, 246465 bytes, 0 no buffer
     Received 687 broadcasts (0 IP multicasts)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 input packets with dribble condition detected
     4163 packets output, 454396 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
```

2) Εκτελώ ping από τον R1 προς τις απευθείας συνδεδεμένες θύρες των R2 και R3:

```
R1#ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/12/28 ms
R1#ping 10.1.3.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.3.2, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 8/11/20 ms
R1#
```

Εκτελώ ping από τον R2 προς τις απευθείας συνδεδεμένες θύρες των R1 και R3:

```
R2#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/8/12 ms
R2#ping 10.1.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
R2#
```

Εκτελώ ping από τον R3 προς τις απευθείας συνδεδεμένες θύρες των R1 και R3:

```
R3#ping 10.1.3.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/16/20 ms
R3#ping 10.1.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/9/16 ms
R3#
```

3)Ενεργοποιώ το πρωτόκολλο δρομολόγησης ospf και ενημερώνονται τα μονοπάτια όπως και φαίνεται:

Για τον R1:

```
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#router-id 1.1.1.1
R1(config-router)#network 0.0.0.0 255.255.255.255 area 0
R1(config-router)#end
R1#
*Mar 10 20:41:12.877: %SYS-5-CONFIG_I: Configured from console by console
R1#
*Mar 10 20:42:29.989: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Ethernet1/0 from LOADING to FULL, Loading Done
R1#
*Mar 10 20:43:18.037: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R1#
```

Για τον R2:

```
R2(config)#router ospf 1
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 0.0.0.0 255.255.255.255 area 0
R2(config-router)#end
R2#
*Mar 10 20:41:30.541: %SYS-5-CONFIG_I: Configured from console by console
R2#
*Mar 10 20:42:09.889: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Ethernet1/0 from LOADING to FULL, Loading Done
R2#
*Mar 10 20:42:57.933: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on Ethernet1/1 from LOADING to FULL, Loading Done
R2#
```

Για τον R3:

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 0.0.0.0 255.255.255.255 area 0
R3(config-router)#end
R3#
*Mar 10 20:42:57.709: %OSPF-5-ADJCHG: Process 1, Nbr 2.2.2.2 on Ethernet1/1 from LOADING to FULL, Loading Done
*Mar 10 20:42:57.709: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Ethernet1/0 from LOADING to FULL, Loading Done
*Mar 10 20:42:58.273: %SYS-5-CONFIG_I: Configured from console by console
R3#
```

Ξαναεκτελώ ping για τις όχι αντικριστές συνδέσεις από τον R1 σε R2 και R3

```
R1#ping 10.1.2.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.2.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/24/32 ms
R1#ping 10.1.2.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/19/32 ms
```

Ξαναεκτελώ ping για τις όχι αντικριστές συνδέσεις από τον R2 σε R1 και R3

```
R2#ping 10.1.3.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.3.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/9/16 ms
R2#ping 10.1.3.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.3.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/19/24 ms
R2#pi
```

Ξαναεκτελώ ping για τις όχι αντικριστές συνδέσεις από τον R3 σε R2 και R1

```
R3#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/9/12 ms
R3#ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/17/20 ms
R3#
```

5) Δείχνω τα μονοπάτια δρομολόγησης για κάθε έναν δρομολογητή με τις εντολές sh ip ospf neigh και sh ip route για τον R1:

```
R1#sh ip ospf neigh

Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           1   FULL/BDR        00:00:36    10.1.3.2        Ethernet1/1
2.2.2.2           1   FULL/DR         00:00:35    10.1.1.2        Ethernet1/0
R1#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

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
C        1.1.1.1 is directly connected, Loopback0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/11] via 10.1.1.2, 00:09:30, Ethernet1/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/11] via 10.1.3.2, 00:08:41, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C        10.1.1.0/24 is directly connected, Ethernet1/0
L        10.1.1.1/32 is directly connected, Ethernet1/0
O        10.1.2.0/24 [110/20] via 10.1.3.2, 00:08:41, Ethernet1/1
                     [110/20] via 10.1.1.2, 00:09:30, Ethernet1/0
C        10.1.3.0/24 is directly connected, Ethernet1/1
L        10.1.3.1/32 is directly connected, Ethernet1/1
R1#
```

```
R2#sh ip ospf neigh

Neighbor ID     Pri   State           Dead Time   Address         Interface
3.3.3.3           1   FULL/BDR        00:00:32    10.1.2.2        Ethernet1/1
1.1.1.1           1   FULL/DR         00:00:34    10.1.1.1        Ethernet1/0
R2#
```

Δείχνω τα μονοπάτια δρομολόγησης για κάθε έναν δρομολογητή με τις εντολές sh ip ospf neigh και sh ip route για τον R2:

```
R2#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

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
O        1.1.1.1 [110/11] via 10.1.1.1, 00:10:01, Ethernet1/0
      2.0.0.0/32 is subnetted, 1 subnets
C        2.2.2.2 is directly connected, Loopback0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/11] via 10.1.2.2, 00:09:12, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C        10.1.1.0/24 is directly connected, Ethernet1/0
L        10.1.1.2/32 is directly connected, Ethernet1/0
C        10.1.2.0/24 is directly connected, Ethernet1/1
L        10.1.2.1/32 is directly connected, Ethernet1/1
O        10.1.3.0/24 [110/20] via 10.1.2.2, 00:09:12, Ethernet1/1
                     [110/20] via 10.1.1.1, 00:10:01, Ethernet1/0
R2#
```

Δείχνω τα μονοπάτια δρομολόγησης για κάθε έναν δρομολογητή με τις εντολές sh ip ospf neigh και sh ip route για τον R3:

```
R3#sh ip ospf neigh

Neighbor ID     Pri   State           Dead Time   Address         Interface
2.2.2.2           1   FULL/DR         00:00:32    10.1.2.1        Ethernet1/1
1.1.1.1           1   FULL/DR         00:00:35    10.1.3.1        Ethernet1/0
R3#
```

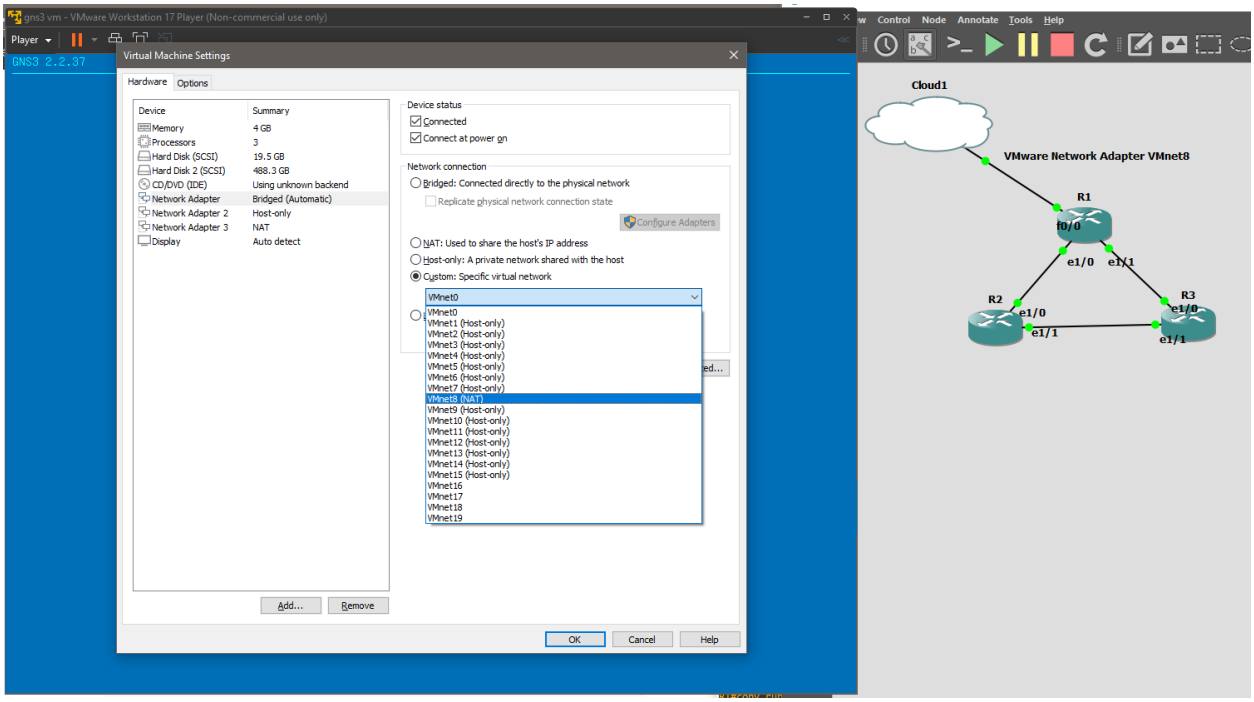
```
R3#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - 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

Gateway of last resort is not set

      1.0.0.0/32 is subnetted, 1 subnets
O        1.1.1.1 [110/11] via 10.1.3.1, 00:09:39, Ethernet1/0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/11] via 10.1.2.1, 00:09:39, Ethernet1/1
      3.0.0.0/32 is subnetted, 1 subnets
C        3.3.3.3 is directly connected, Loopback0
      10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
O        10.1.1.0/24 [110/20] via 10.1.3.1, 00:09:39, Ethernet1/0
                     [110/20] via 10.1.2.1, 00:09:39, Ethernet1/1
C        10.1.2.0/24 is directly connected, Ethernet1/1
L        10.1.2.2/32 is directly connected, Ethernet1/1
C        10.1.3.0/24 is directly connected, Ethernet1/0
L        10.1.3.2/32 is directly connected, Ethernet1/0
R3#
```

ΜΕΡΟΣ Β

1)Επειδή δεν μπορώ να εγγυηθώ ότι έχουν όλοι στον Network Adapter 3 το NAT, το συνέδεσα στον VMnet8 που είναι global NAT για ολους.



Ακολουθώ τις οδηγίες του Link που επισυνάψατε:

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface FastEthernet0/0
R1(config-if)#ip address dhcp
R1(config-if)#no shutdown
R1(config-if)#end
R1#
*Mar 14 01:05:27.147: %SYS-5-CONFIG_I: Configured from console by console
R1#
*Mar 14 01:05:33.455: %DHCP-6-ADDRESS_ASSIGN: Interface FastEthernet0/0 assigned DHCP address 192.168.5.131, mask 255.255.25
5.0, hostname R1

R1#show 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

Gateway of last resort is 192.168.5.2 to network 0.0.0.0

S*    0.0.0.0/0 [254/0] via 192.168.5.2
      1.0.0.0/32 is subnetted, 1 subnets
C        1.1.1.1 is directly connected, Loopback0
      2.0.0.0/32 is subnetted, 1 subnets
O        2.2.2.2 [110/11] via 10.1.1.2, 00:02:34, Ethernet1/0
      3.0.0.0/32 is subnetted, 1 subnets
O        3.3.3.3 [110/11] via 10.1.3.2, 00:02:34, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C        10.1.1.0/24 is directly connected, Ethernet1/0
L        10.1.1.1/32 is directly connected, Ethernet1/0

R1#ping 192.168.5.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.5.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/13/24 ms
R1#
```

Εκτελώ ping 8.8.8.8 από τον R1:

```
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip domain-lookup
R1(config)#ip name-server 8.8.8.8
R1(config)#end
R1#
*Mar 14 01:07:24.919: %SYS-5-CONFIG_I: Configured from console by console
R1#ping google.com
Translating "google.com"...domain server (192.168.5.2) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 216.58.212.46, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 72/82/104 ms
R1#ping 8.8.8.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
!!!!!
```

Εκτελώ ping 8.8.8.8  από τον R2:

Εκτελώ ping 8.8.8.8  από τον R3:

Εκτελώ traceroute 8.8.8.8 από τον R2: