

Εργαστήριο Δικτύων

ΑΓΓΕΛΟΣ ΝΙΚΟΛΑΟΣ ΠΟΤΑΜΙΑΝΟΣ

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ΜΕΡΟΣ Α

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

The screenshot displays the GNS3 application window titled "1084537_askisi2 - GNS3". The main workspace shows a network topology with three routers (R1, R2, R3) and a cloud (Cloud1). R1 is connected to Cloud1 via a "VMware Network Adapter VMnet8". R1 has interfaces 10.1.1.1 (e1/0) and 10.1.3.1 (e1/1). R2 has interfaces 10.1.1.2 (e1/0) and 10.1.2.1 (e1/1). R3 has interfaces 10.1.3.2 (e1/0) and 10.1.2.2 (e1/1). Connections are shown between R1 and R2, and R1 and R3. A "Topology Summary" panel on the right lists the nodes and their console addresses: Cloud1 (none), R1 (telnet 192.168.1.9:5003), R2 (telnet 192.168.1.9:5004), and R3 (telnet 192.168.1.9:5005).

Overlaid on the GNS3 window is a Notepad++ window titled "C:\Users\Nick\AppData\Roaming\GNS3\2.2\gns3_server.ini - Notepad++". It shows the configuration file gns3_server.ini with the following content:

```
13 auto_start = True
14 allow_console_from_anywhere = False
15 auth = True
16 user = gns3@192.168.229.128
17 password = gns3
18 protocol = http
19 console_start_port_range = 5000
20 console_end_port_range = 10000
21 udp_start_port_range = 2000
22 udp_end_port_range = 3000
23
24 [VMware]
25 host_type = player
26 vmnet_start_range = 2
27 vmnet_end_range = 15
28 block_host_traffic = False
29 vmrun_path = F:\Programs\vmware\vmrun.exe
30
31
```

The status bar at the bottom of the Notepad++ window indicates "MS length: 800 lines: 31", "Ln: 21 Col: 1 Sel: 54 | 2", "Windows (CR LF)", "UTF-8", and "INS".

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
R2#
```

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:

```

R1
Success rate is 0 percent (0/5)
R1#sh ip int br

```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	unset	administratively down	down
Ethernet1/0	10.1.1.1	YES	manual	up	up
Ethernet1/1	10.1.3.1	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	1.1.1.1	YES	manual	up	up

```

R1#sh int e1/0
Ethernet1/0 is up, line protocol is up
  Hardware is AmdP2, address is ca01.298e.001c (bia ca01.298e.001c)
  Internet address is 10.1.1.1/24
  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 00:00:03, output 00:00:04, 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
    741 packets input, 254514 bytes, 0 no buffer
    Received 714 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
  4284 packets output, 467559 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets

R1#sh int e1/1
Ethernet1/1 is up, line protocol is up
  Hardware is AmdP2, address is ca01.298e.001d (bia ca01.298e.001d)
  Internet address is 10.1.3.1/24
  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 00:00:08, output 00:00:00, 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
    725 packets input, 248599 bytes, 0 no buffer
    Received 710 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
  4216 packets output, 460783 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets

R1#

```

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

```

R1 R2 R3
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 unassigned YES unset administratively down down
Ethernet1/0 10.1.1.2 YES manual up up
Ethernet1/1 10.1.2.1 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 2.2.2.2 YES manual up up

R2#sh int e1/0
Ethernet1/0 is up, line protocol is up
  Hardware is AmdP2, address is ca02.29b0.001c (bia ca02.29b0.001c)
  Internet address is 10.1.1.2/24
  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 00:00:18, output 00:00:00, 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
    745 packets input, 253346 bytes, 0 no buffer
    Received 719 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    4249 packets output, 465011 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets

R2#sh int e1/1
Ethernet1/1 is up, line protocol is up
  Hardware is AmdP2, address is ca02.29b0.001d (bia ca02.29b0.001d)
  Internet address is 10.1.2.1/24
  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 00:00:01, output 00:00:02, 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
    761 packets input, 250276 bytes, 0 no buffer
    Received 721 broadcasts (0 IP multicasts)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    4135 packets output, 451779 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out

```

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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 runs, 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 runs, 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:

```
[OK]
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#
```

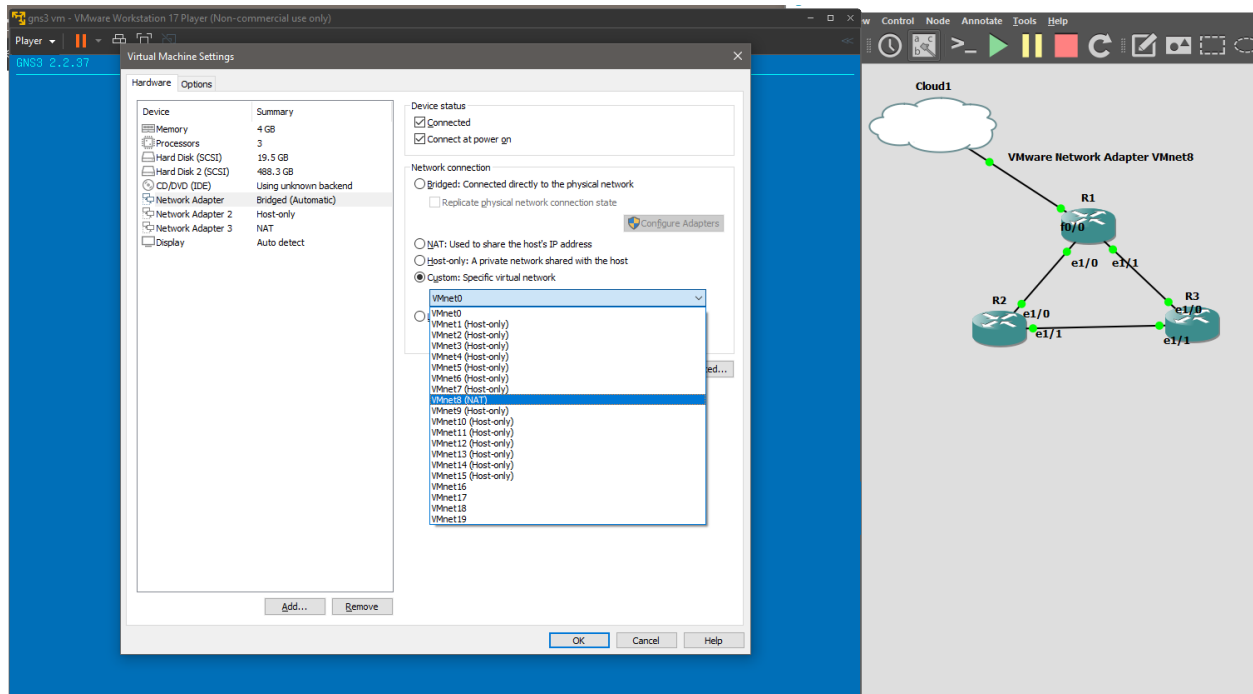
```
R3#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - 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 συνδέσα στον VMnet8 που είναι global NAT για όλους.



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 255.255.255.0, 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:

```

R1
R2
R3
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#
*Mar 14 01:31:22.351: %SYS-5-CONFIG_I: Configured from console by console
R2(config)#router ospf 1
R2(config-router)#network 10.0.0.0 0.255.255.255 area 0
^
% Invalid input detected at '^' marker.

R2(config-router)#network 10.0.0.0 0.255.255.255 area 0
R2(config-router)#end
R2#
*Mar 14 01:31:55.155: %SYS-5-CONFIG_I: Configured from console by console
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip domain-lookup
R2(config)#ip name-server 8.8.8.8
R2(config)#end
R2#p
*Mar 14 01:32:18.115: %SYS-5-CONFIG_I: Configured from console by console
R2#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:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/62/76 ms
R2#ping google.com
Translating "google.com"...domain server (8.8.8.8) [OK]

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 142.250.185.110, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/60/68 ms
R2#
```

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Εκτελώ ping 8.8.8.8 από τον R3:



```
*Mar 14 01:28:24.511: %OSPF-5-ADJCHG: Process 1, Nbr 1.1.1.1 on Ethernet1/0 from LOADING to FULL, Loading Done
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#router ospf 1
R3(config-router)#network 10.0.0.0 0.255.255.255 area 0
^
% Invalid input detected at '^' marker.

R3(config-router)#network 10.0.0.0 0.255.255.255 area 0
R3(config-router)#end
R3#
*Mar 14 01:33:39.831: %SYS-5-CONFIG_I: Configured from console by console
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip domain-lookup
R3(config)#ip name-server 8.8.8.8
R3(config)#end
R3#ping
*Mar 14 01:33:55.707: %SYS-5-CONFIG_I: Configured from console by console
R3#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:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/63/84 ms
R3#ping google.com
Translating "google.com"...domain server (8.8.8.8) [OK]
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 216.58.212.174, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/78/96 ms
R3#
```

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Εκτελώ traceroute 8.8.8.8 από τον R2:

```

R1
R2
R3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 142.250.185.110, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 52/60/68 ms
R2#copy running-config startup-config
Destination filename [startup-config]?
Warning: Attempting to overwrite an NVRAM configuration previously written
by a different version of the system image.
Overwrite the previous NVRAM configuration?[confirm]
Building configuration...
[OK]
R2#traceroute 8.8.8.8
Type escape sequence to abort.
Tracing the route to dns.google (8.8.8.8)
VRF info: (vrf in name/id, vrf out name/id)
 0 10.1.1.1 44 msec 20 msec 32 msec
 1 192.168.5.2 48 msec 24 msec 20 msec
 2 * * *
 3 * * *
 4 * * *
 5 * * *
 6 * * *
 7 * * *
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 * * *
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
R2#
```

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