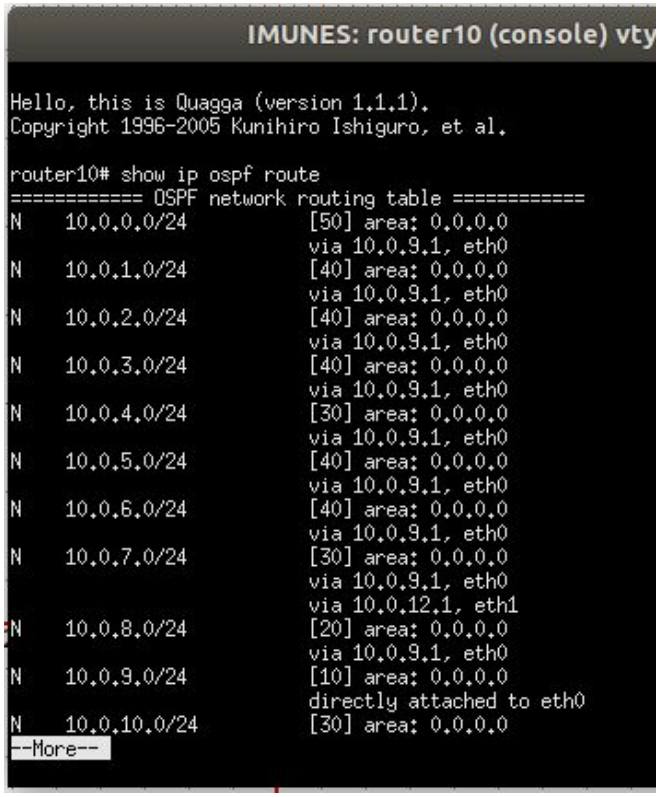
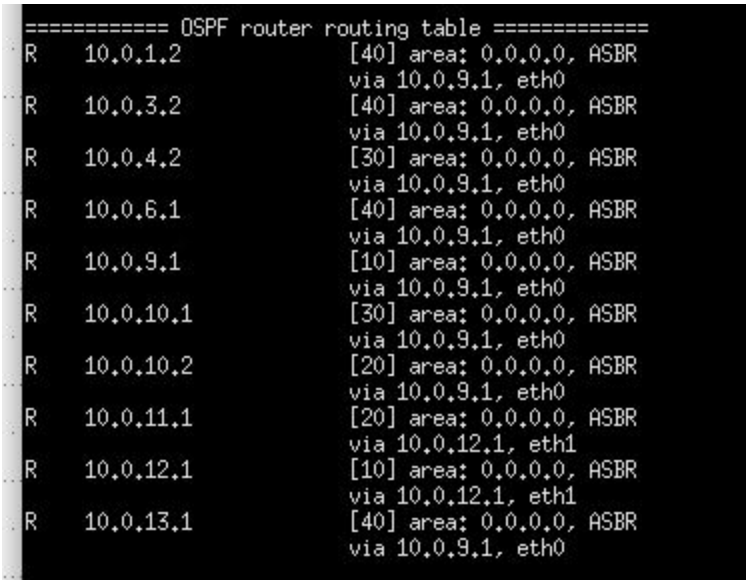
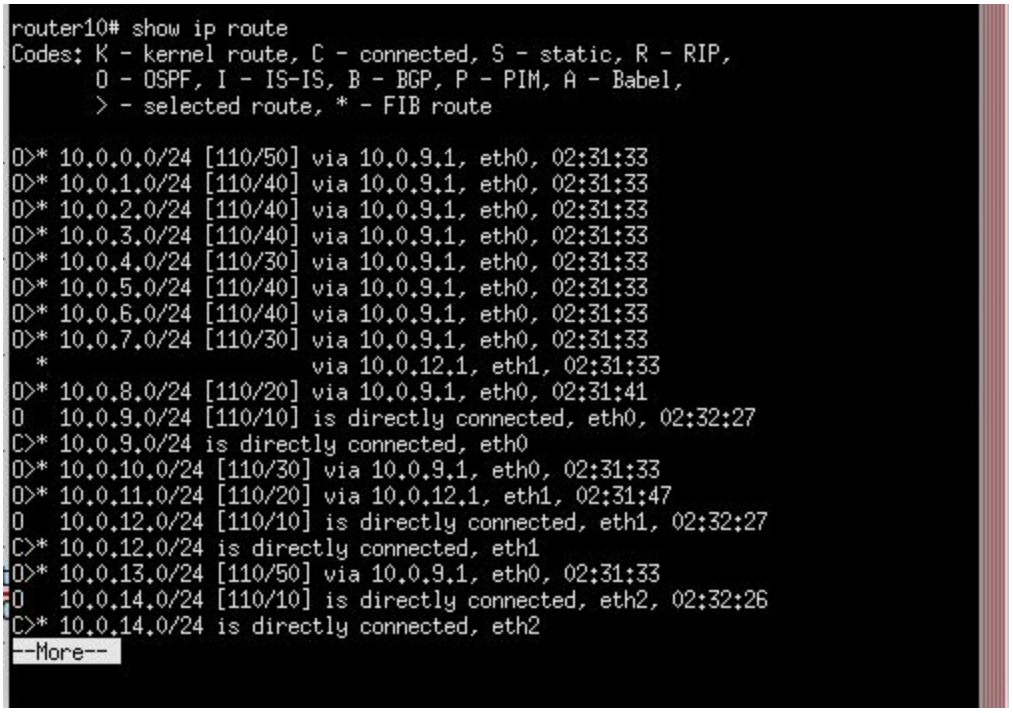
GRIGORIS ZINONOS
TASK 2





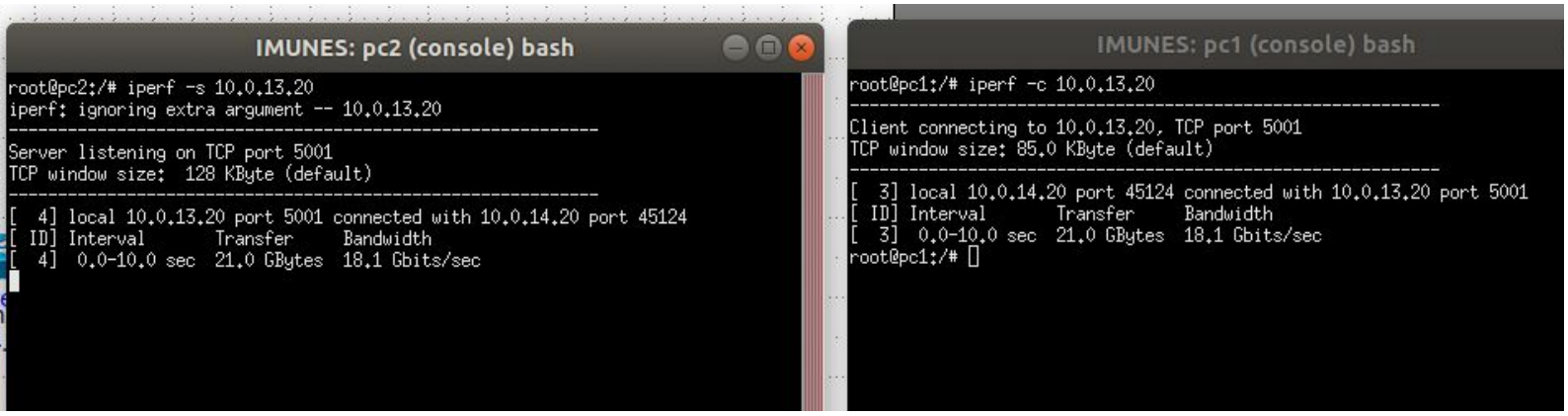
a) Show ip ospf route
b) Router 9
c) 30
d) Router5 was installed some time after rooter9.This happens because the routes need to be propagated from one router to the other, so router5 that is further from the local router takes longer time to be established than router 9 which is only one hop away from router 10. Used show ip route



TASK 3

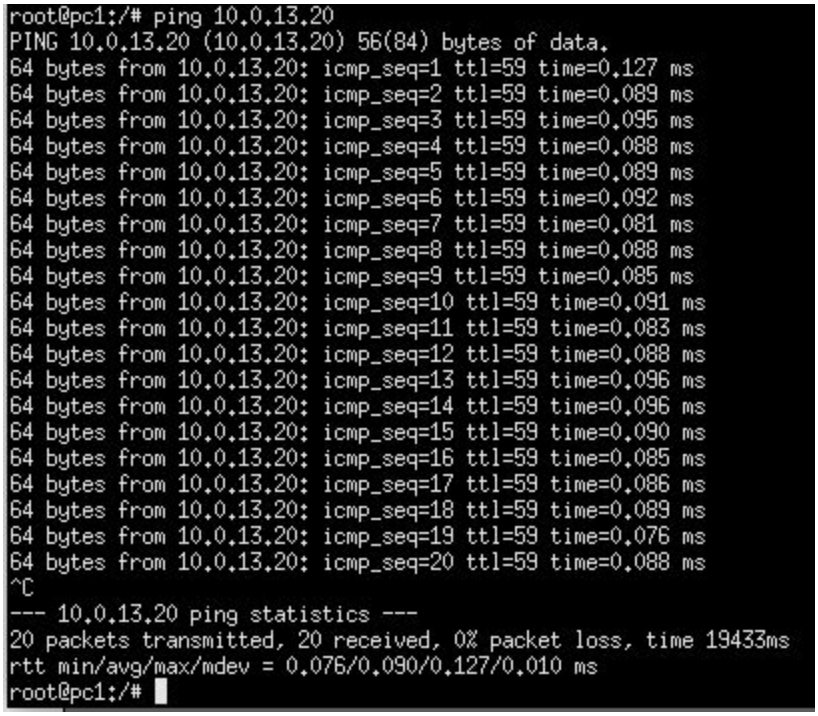
a) traceroute 10.0.13.20

b) iperf -s 10.0.13.20
Iperf -c 10.0.13.20



c) As seen from the outcome of traceroute. Router 10, router 9, router 7, router 4, router 5.

d) The average RTT between pc1 and pc2 is 0.090 ms. (used PING)



TASK 5

a) The green area (ID 0.0.0.0) is the backbone of the topology as it is the logical link that connects the remaining areas.

b) This time the path cost is bigger and the next hop is the same. The path cost increased as now the path needs to go through the green area which acts as the backbone area in order to reach router 4. The link between router 7 and router 4 can not be used as used in task 2 and therefore shorten the path cost because router 7 and router 4 belong to different areas.

```
============ OSPF router routing table =============
R    10.0.1.2          IA [40] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.3.2          IA [40] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.4.2             [30] area: 2.0.0.0, ABR, ASBR
                          via 10.0.9.1, eth0
R    10.0.6.1          IA [60] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.9.1             [10] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.10.1         IA [50] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.10.2            [20] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0
R    10.0.11.1            [20] area: 2.0.0.0, ASBR
                          via 10.0.12.1, eth1
R    10.0.12.1            [10] area: 2.0.0.0, ASBR
                          via 10.0.12.1, eth1
R    10.0.13.1         IA [60] area: 2.0.0.0, ASBR
                          via 10.0.9.1, eth0

============ OSPF external routing table ===========
```

c)

i) 1

```
root@router4:/# traceroute 10.0.10.2
traceroute to 10.0.10.2 (10.0.10.2), 30 hops max, 60 byte packets
 1  10.0.10.2 (10.0.10.2)  0.339 ms  0.284 ms  0.266 ms
root@router4:/#
```

ii) 1

```
root@router7:/# traceroute 10.0.9.1
traceroute to 10.0.9.1 (10.0.9.1), 30 hops max, 60 byte packets
 1  10.0.9.1 (10.0.9.1)  0.350 ms  0.299 ms  0.283 ms
root@router7:/#
```

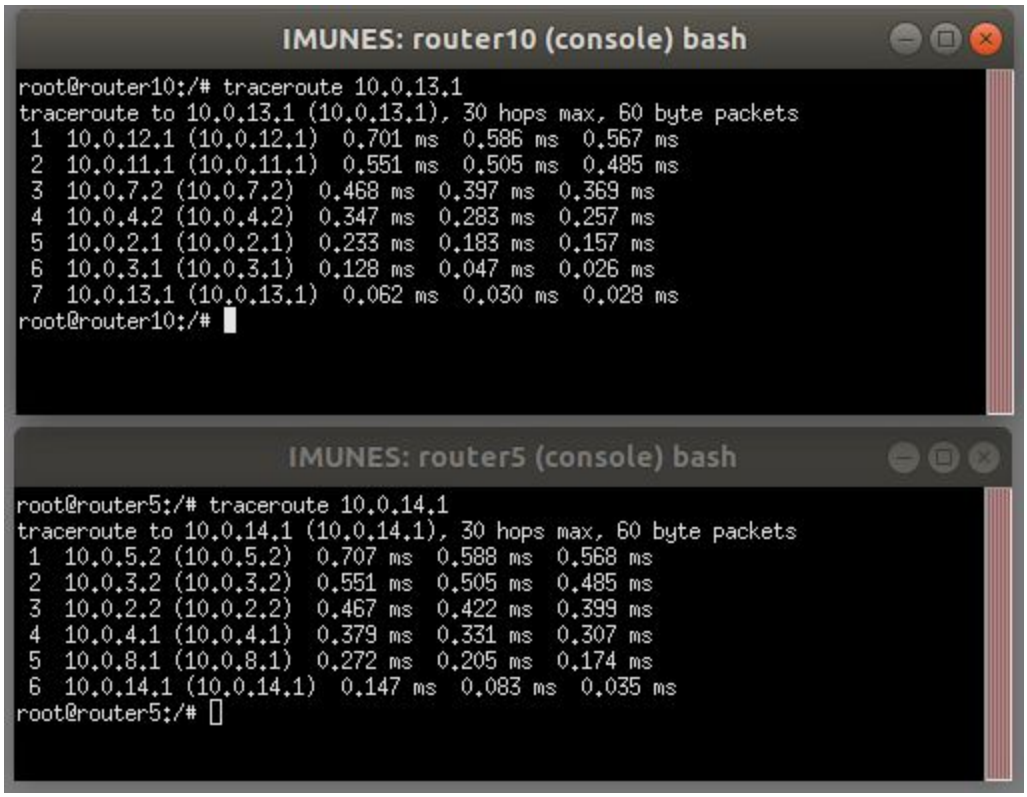
iii) 4

```
root@router4:/# traceroute 10.0.9.1
traceroute to 10.0.9.1 (10.0.9.1), 30 hops max, 60 byte packets
 1  10.0.3.2 (10.0.3.2)  0.441 ms  0.388 ms  0.372 ms
 2  10.0.2.2 (10.0.2.2)  0.359 ms  0.327 ms  0.308 ms
 3  10.0.4.1 (10.0.4.1)  0.292 ms  0.260 ms  0.240 ms
 4  10.0.9.1 (10.0.9.1)  0.220 ms  0.186 ms  0.162 ms
root@router4:/#
```

The third path is not the same as the concatenation of path i and path ii. Path i equals 1 as the link which connects router 4 and router 7 acts as a ‘private network’ or as a “hidden area” which only involves router 4 and router 7. The 2 connected interfaces of router 4 and 7 can exchange traffic directly because they belong to the same subnet and have the same MTU value despite the fact that they belong to different areas. Path ii equals 1 because the 2 routers belong to the same area and one is only one hop away from the other. When measuring path iii, the link between router 4 and router 7 can not be used as the 2 routers do not act as backbone routers to connect the blue area with the red area but only the 2 routers. Therefore the path needs to go through the green area which acts as a backbone area for the blue and red area.

TASK 6

b)



i) router 10, router 11, router 8, router 7, router 3, router 2, router 4, router 5.
ii) router 5, router 4, router 2, router 3, router 7, router 9, router 10.

The 2 paths are not symmetric and they do not traverse the same routers. When starting from router 10 the path goes through router 11 instead of router 9 which adds router 8 to the path because of the changes that I made for task 6a. Therefore the path is one hop longer than path ii.

TASK 7