Report

Assignment 4
- Network Topology and Routing

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Course: Computer Networks
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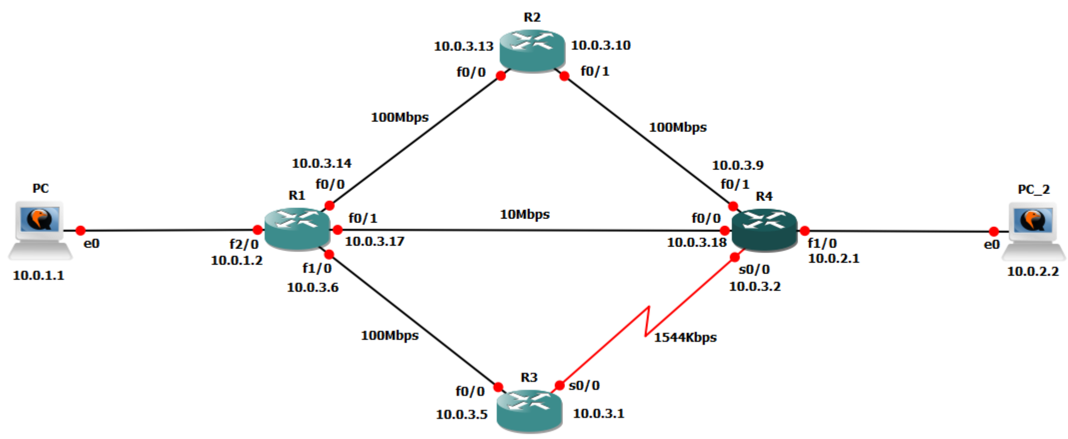
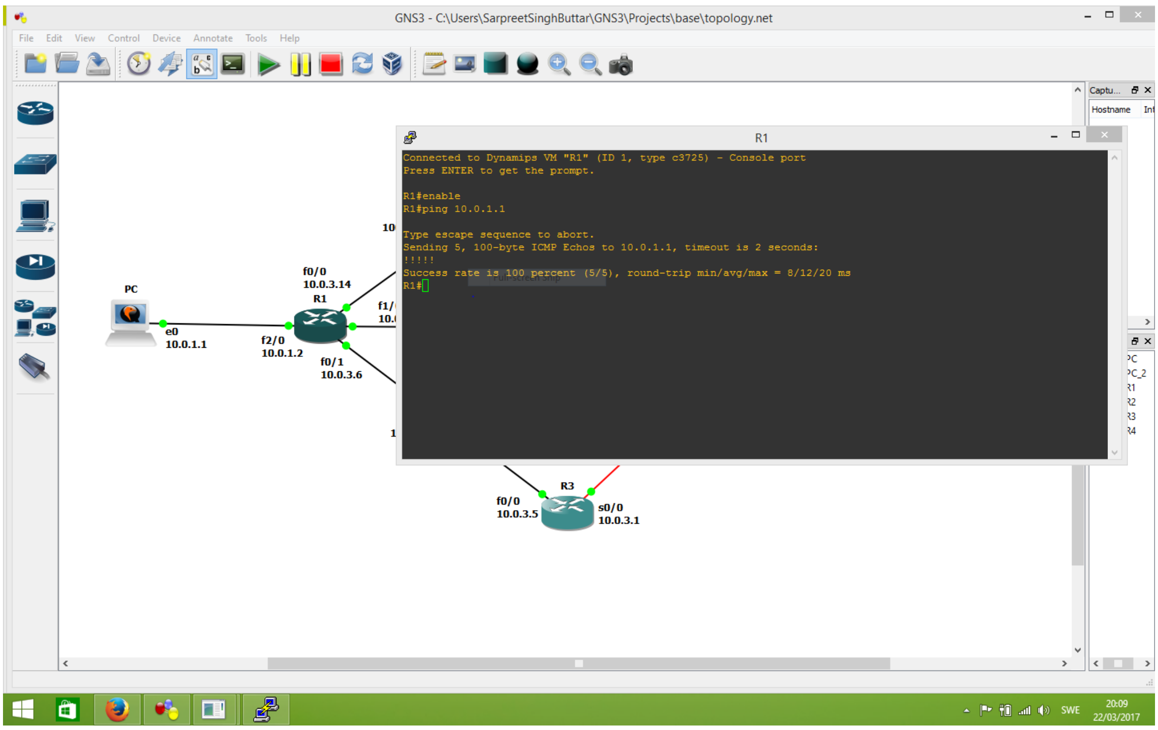
Problem 1

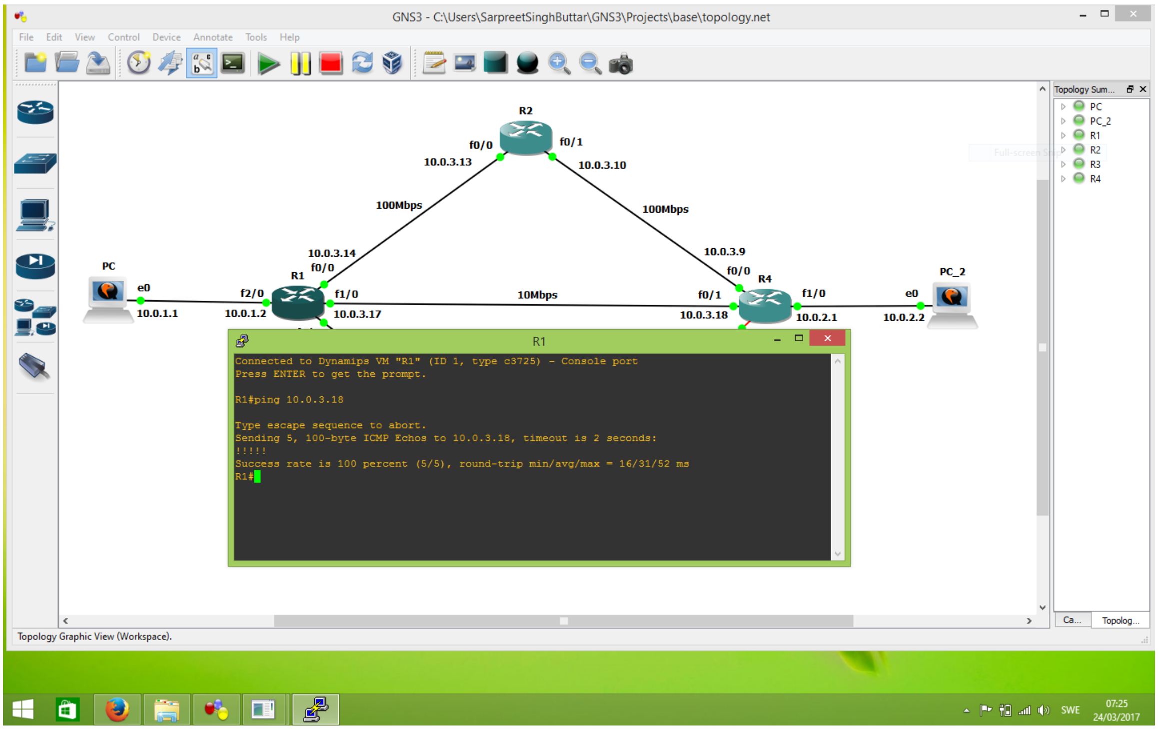
Below is the topology picture from GNS3



Below image shows the ping from R1 to C1



Below image shows the ping from R1 to R4



NM-1FE-TX

It is a network module (NM) which include one-port fast Ethernet (1FE) with 10/100Base (TX) interface. It supports VLAN deployment such as groups can be made logically instead of physical location, easily adds, moves and switch within the network.

WIC-1T

It is a 1-port serial (1T) WAN interface card (WIC) which grant serial connections to remote destinations (sites or network devices).

Why NM-1FE-TX

Because NM-4T does not support async mode, NM-16ESW provides 16 ports(lot more than we needed), NM-NAM have lack of needed facilities such as it does not have an external console port etc and NM-CIDS can only be configured for promiscuous (IDS) mode.

Why WIC-1T

Because WIC-2T supports max speed of 8 Mbps per port.

Practical difference between a /24 and a /30 subnet

a/30 subnet mask is more efficient then a a/24 subnet when it comes to a point to point network connection because it does not waste any IP addresses.

Problem 2

I assume that you want me to explain the *ip route* command in general rather than writing the parameter values which I have used for configuring the routers.

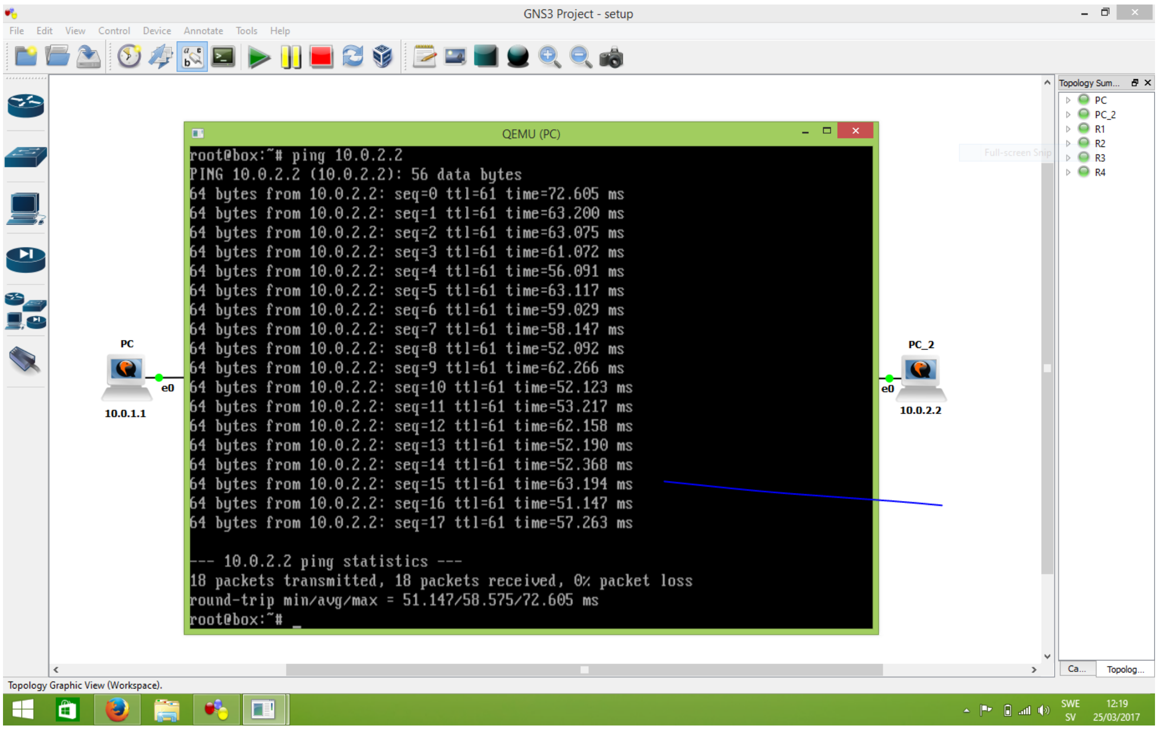
[ip] = It is the ip address of router to be connected

[mask] = It is the subnet mask of the given **[ip]**

[router_interface] = It is the interface on which the router to be connected is attached such as f0/0, s0/0, f1/0 etc.

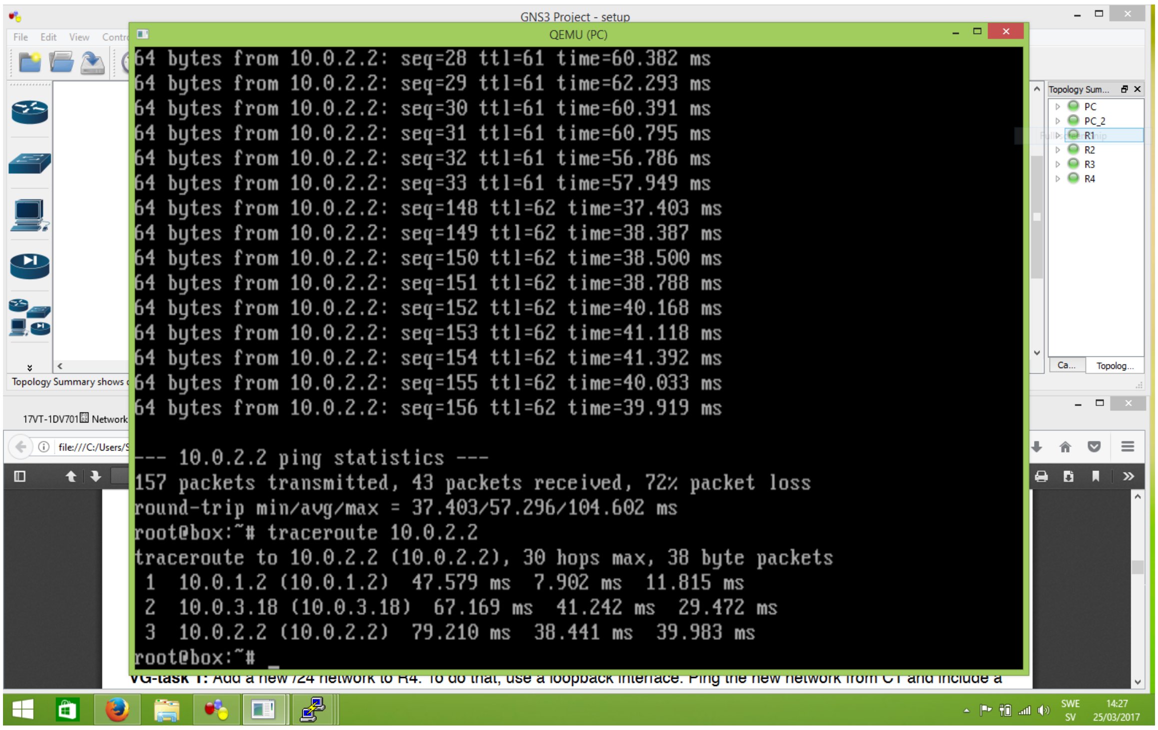
[metric] = It is the process number which decides its priority.

Below image shows the ping from C1 to C2



I have chosen C1 -> R1 -> R2 -> R4 -> C2 based on the speed priority. All the other paths have less speed as compare to the chosen path.

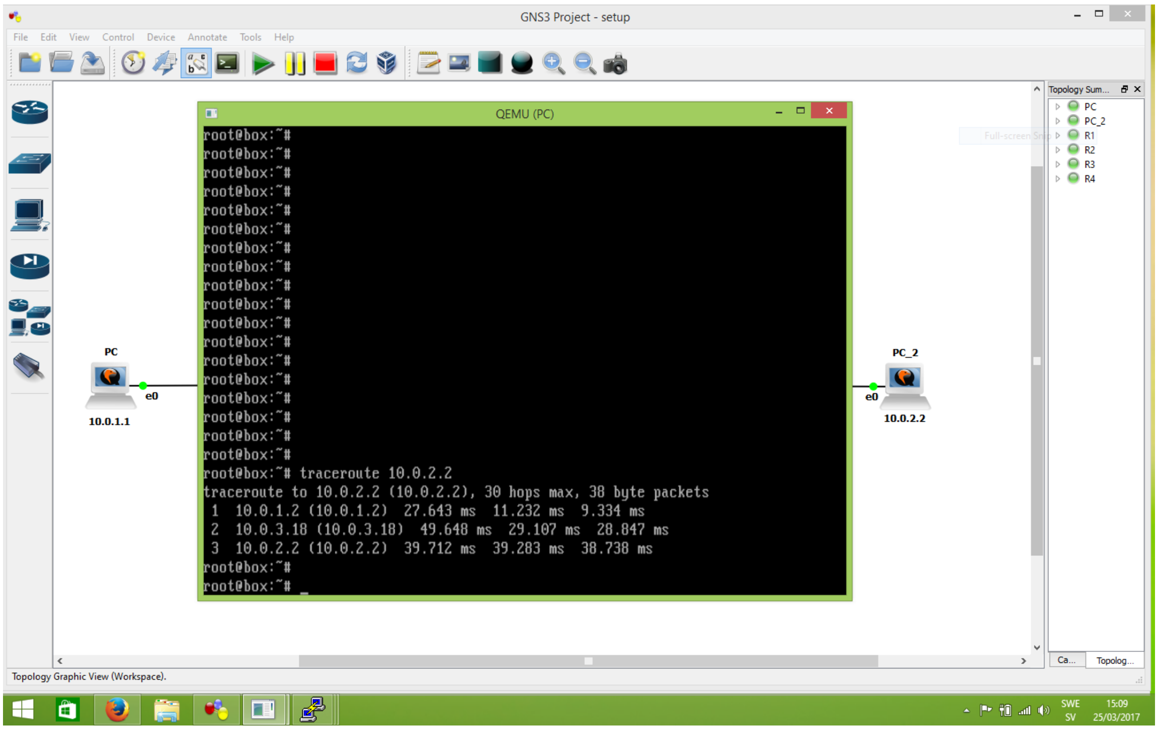
Below image shows the ping from C1 to C2 before and after shutting down the active route



We can see from the picture that 72% (114 packets) are lost before a new routing pass start working. I realised that change in routing path when continuous ping starts working again. In addition, I also used *traceroute* command to verify the new route (C1 -> R1 -> R4 -> C2).

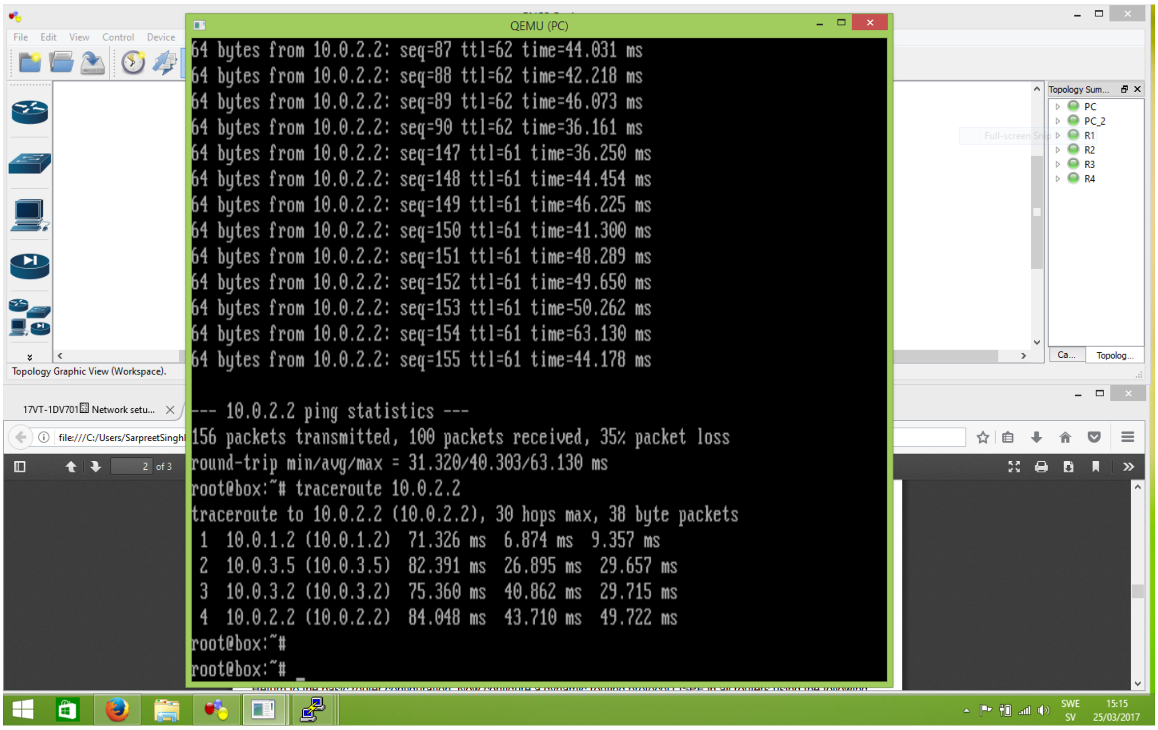
Problem 3

Below image shows the most efficient path (C1 -> R1 -> R4 -> C2) selected by RIPv2



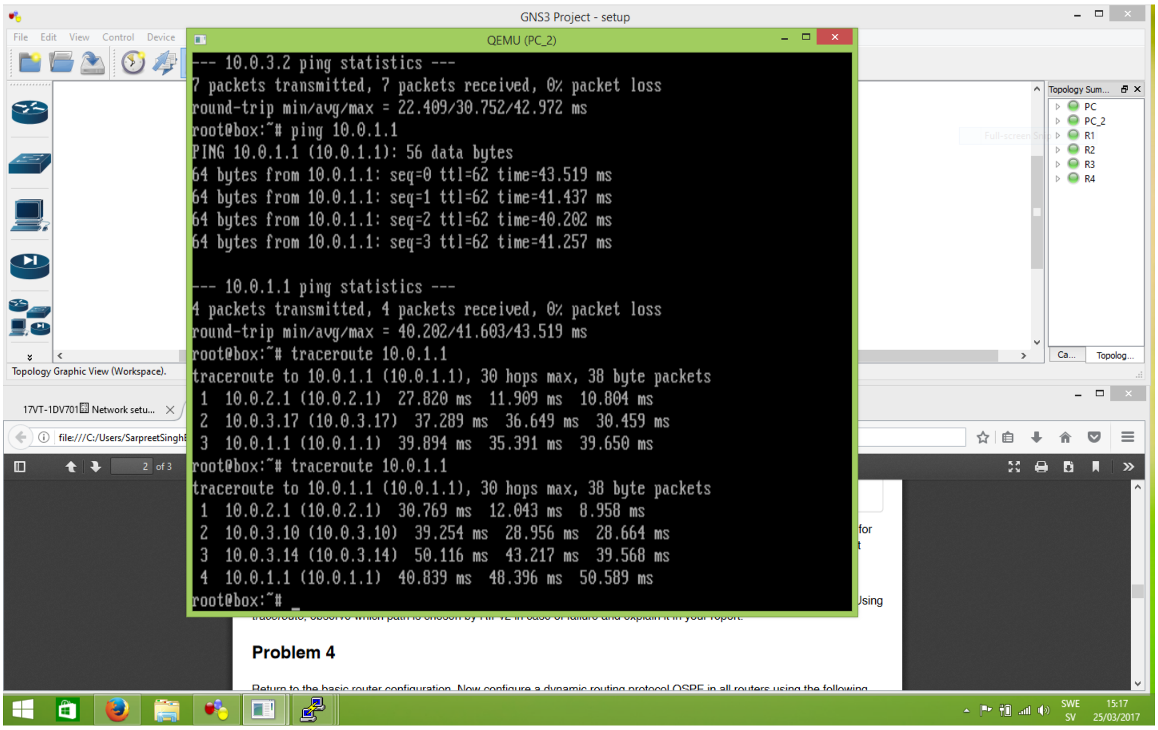
The reason behind this path is the RIPv2 hop count algorithm means counting the shortest number of routers from start to the destination. Both alternative paths have 1 extra router than this path.

Below image shows the alternative path (C1 -> R1 -> R3 -> R4 -> C2) selected by RIPv2.



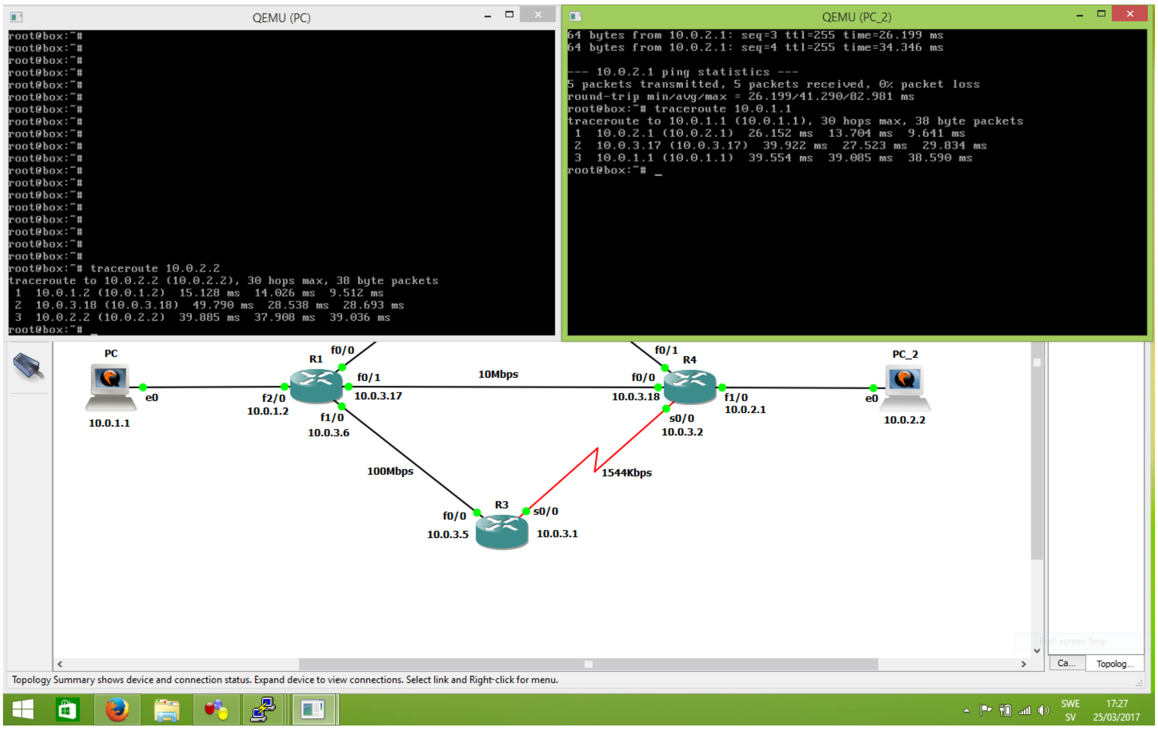
We can see from the picture that 35% (56 packets) are lost before a new routing pass starts working. The reason for selecting this path is hop count alogorthim, however we know that both alternative paths C1 -> R1 -> R2 -> R4 -> C2 and C1 -> R1 -> R3 -> R4 -> C2 have same amount of hops, so in these cases RIPv2 select the path randomly.

Below picture support my above statement regarding the randomly chosen path. It shows a ping from C2 to C1 via R2 rather than R3 (chosen by C1)



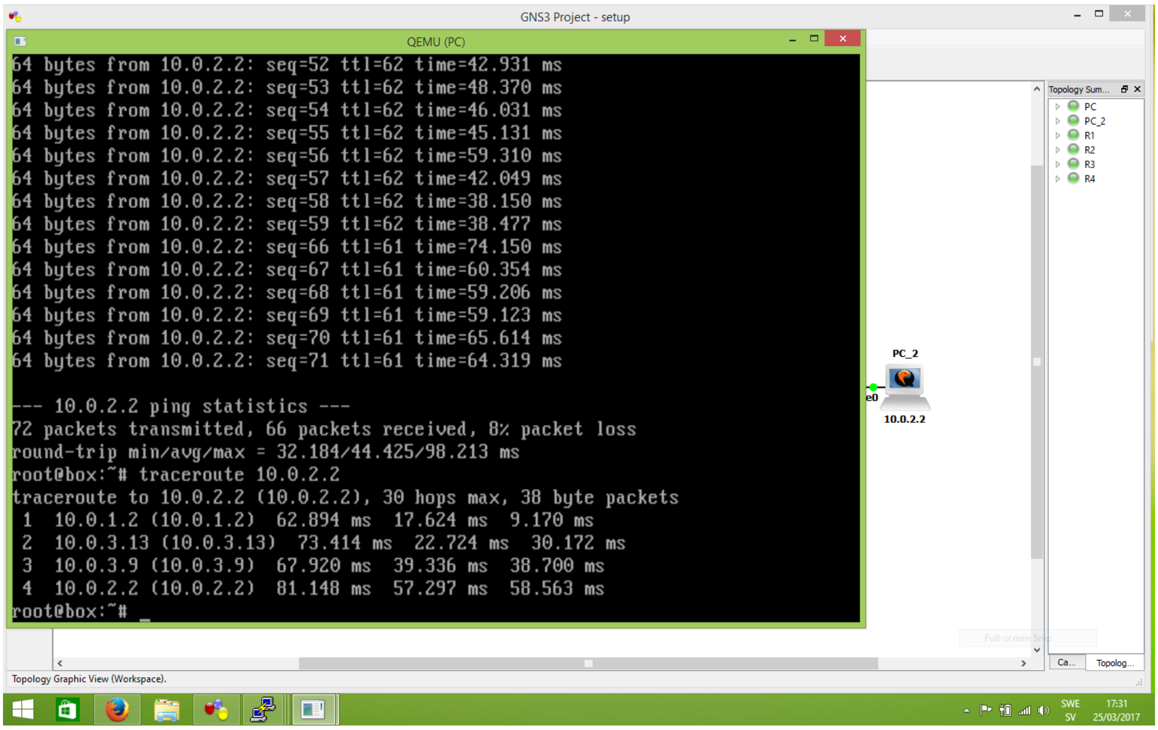
Problem 4

Below image shows the most efficient path selected by OSPF. From C1 to C2 it is via R1 -> R4 and from C2 to C1 it is via R4 -> R1



The reason behind this path is that OSPF is a link-state routing protocol which means when router send a hello packet for discovering its neighbours and select as designated routers. The hello packet contains list of neighbours as well as link state information. In this case, R1 knows that C2 is neighbour of R4.

Below image shows the alternative path (C1 -> R1 -> R2 -> R4 -> C2) selected by RIPv2.



We can see from the picture that 8% (6 packets) are lost before a new routing pass starts working. The reason for selecting this path is cost metric (100Mbps = 1 and 1544Kbps = 64).

Conclusion

Key Differences		
Static	**RIPv2**	**OSPF**
It is based on given configuration	It is based on distance vector	It is based on link-state
It works on Layer 2	It works on Layer 3	It works on Layer 3
It's configuration is fast and easy	It's configuration is fast and easy	It's configuration is hard and time consuming
In case of failure, package lost is very high (more than 70%)	In case of failure, package lost is average (less than 40%)	In case of failure, package lost is very less (less than 10%)
It is most efficient to use on a small networks where there is no need for redundant link	It is most efficient to use on a small networks which are not very dynamic and have less than 15 hops	It is most efficient to use on both small and large networks