[4 marks] IP addresses:

1. Looking at the addresses found for the different sites in Part 1, do some sites have  
   more than one IP address, and what does it mean if they do?

There are several sites that has more than one IP address when executing dnslookup program for example “ebay.vn” at the time had 2 IPv4 addresses as 66.211.181.235 and 66.135.211.132. This result is due to a load balancing mechanism which is called “DNS round robin”. This mechanism is implemented as a simple solution to balance the traffic load between the available servers. For each time the DNS server being hit with a DNS request, it returns one of the available IP of that domain and this would be shuffled around. Usually if a browser send the DNS request, the server would only reply with a single shuffled IP address. But the way dnslookup work is that it would look for all of the IP addresses at that domain. Hence the execution would sometimes show up multiple addresses for some domains.

1. If you run your dnslookup program  
   several times, do you always get the same IP addresses for a site, and if not, why might this be?

When running dnslookup several times, for some sites, the IP addresses stay the same while for some others, the IP addresses changed in a ordered rotation. The IP addresses stay the same for some sites as they implements

1. Do you get the same IP addresses for a site if you run your dnslookup program from different  
   locations, and if not, why?
2. What proportion of sites have an IPv6 address?

[4 marks] • Router-level Topology Maps: Looking at the router level topology maps you produced in Part  
2 of this exercise, what is the longest path you can find in the network? Are paths from different  
locations to the same destination disjoint? Are there multiple routes to some destinations? Can you  
infer anything about organisational boundaries (e.g., which parts of the network are operated by  
different ISPs) from changes in the IP address prefixes?  
[2 marks] • IPv4 and IPv6: Do the IPv4 and IPv6 router level network topology maps match? The addresses  
will be different, of course, but do the topology maps have the similar structure? Discuss whether  
you expect that they should have similar structure.  
[2 marks] • The traceroute Tool: How does the traceroute tool work? Do some background reading, and  
in your own words explain how traceroute can find the IP addresses of the routers on the path to  
a destination. You should discuss how the TTL is varied during a traceroute, what is ICMP, and  
how traceroute uses ICMP