IPv4 & Clos & Datacentres

1) Your computer "fastnet" wants to send a PING packet to a server "www" at Google. Your computer is connected through an IEEE 802.11 access point to the sub-network 134.226.62.0. The two sub-networks 134.226.62.0, 134.226.32.0, etc are separate Ethernet broadcast domains, connected through a router in the School of Computer Science and Statistics with a number of interfaces with the addresses ending in .254 for the individual sub-networks e.g. 134.226.62.254. The computers in the sub-networks use these addresses as the addresses for the default gateway.

Describe the packets that are involved in the PING exchange. The description should include the information that is necessary for the computers and routers to process the IPv4 packets e.g. ARP requests, DNS requests, etc. You can assume that the routers have a full view of the internal network of TCD and do not have to update their routing information.

fastnet.scss.tcd.ie	134.226.62.183
ns.scss.tcd.ie	134.226.32.58
ns.google.com	216.239.32.10
www.google.com	74.125.24.104

> route –n on fastnet:

Subnet	Gateway	Netmask	Interface
134.226.62.0	0.0.0.0	255.255.255.0	eth1
0.0.0.0	134.226.62.254	0.0.0.0	eth1
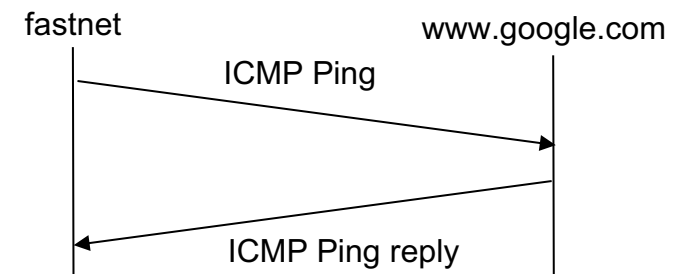
Figure 1: Conceptual view of communication between fastnet and www.google.com

2) Explain the advantages and disadvantages of a data centre where the hardware of the data centre may consist of 512 racks using a fat-tree topology in comparison to a traditional 4-post router approach.
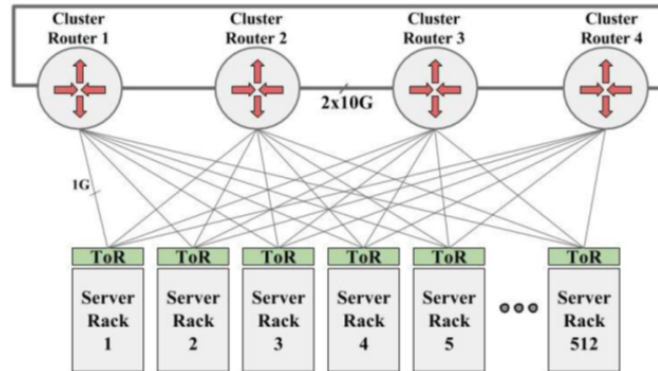

Figure 2: Data centre scenario with 512 racks and 4 routers*

fastnet	134.226.62.254	ns.scss.com	134.226.56.254	134.226.1.2	ns.google.com	www.google.com

time t

TCD

134.226.62.183
00-21-6A-A6-1D-16

134.226.62.254
00-60-70-A6-C2-78

134.226.32.254
00-60-70-D9-1C-52

134.226.32.58
00-21-77-99-6D-55

TCD Router
134.226.1.2
00-20-75-46-15-86

HEAnet
193.1.219.57
00-21-6A-44-DD-AB

INEX
193.242.111.162
00-21-6A-AA-7D-15

Google
209.85.252.162
00-21-6A-98-45-16

74.125.24.104
01-20-6A-AA-BB-16

© Trinity College Dublin