Evolving Internet: Homework 1

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To be sent by e-mail to Walid.Dabbous@inria.fr before 23:59 Wednesday October 20^{th} 2020. Provide a short, personal and clear explanation.

Question 1 : CIDR Routing

A router named Router 1 has the following CIDR entries in its routing table:

Address / Mask	Next Hop
208.12.16.0/20	Router 2
208.12.21.0/24	Router 3
208.12.16.0/24	Router 4
192.53.40.0/23	Router 3
135.46.56.0/22	Router 4
135.46.60.0/22	Router 3
default	Router 2

- What do the first three lines mean? Hint: compare the `/24` prefixes in lines 2 and 3 with the `/20` prefix in line 1.
- For each of the following IP addresses, what would Router 1 do at the reception of a packet with this IP address as the destination address? (explain why by showing bit by bit address-prefix matching):

  135.46.63.10, 135.46.57.14, 135.46.52.2, 192.53.40.7, 192.53.56.7, 208.12.16.0, 208.12.21.0, 208.12.31.0, 208.12.44.0.

Question 2 : Addres management

As the name suggests, CIDR (Classless Inter Domain Routing) is a classless IP addressing approach. We no longer consider an address as belonging implicitly to one of the three classes A, B or C. In CIDR we associate explicitly to every IP address a network mask of length l (denoted $/l$) that defines the prefix that characterizes the network to which this address belongs. The network addresses are now always used with the prefix that can be of arbitrary size (eg /8, /17 and /21).

1. Consider the network designated by the CIDR prefix 193.53.32.0/20. What would be the number of hosts in this network?

2. In the previous network address 193.53.32.0/20 what is the smallest address usable for a host and what is the largest?

3. Suppose that a user restores an old address class A, B or C as 17.0.0.0 or 134.15.0.0 or 194.65.32.0 formerly allocated. These addresses will never be used again by their former owners, can we attribute them to other users according to the CIDR approach (e.g. assign 17.46.64.0/19, 134.15.0.0/20 and 194.65.32.0/21)?

4. A company asks its Internet Service Provider (ISP) for 800 addresses. What should provider do if he was using classful addressing A, B, C to meet his client needs and what are the disadvantages?

5. We assume that the above mentioned ISP owns the 202.0.64.0/18 CIDR block to perform its activities. Each provider is free to subdivide its address space as wanted to allocate addresses to customers. For a customer requesting 800 addresses which prefix the ISP will allocate to the customer if at the time of application the first free network address is 202.0.70.0?

6. Briefly describe how CIDR is a major improvement of the IPv4 addressing.