IP Networks
Mini-Project Report

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1 Objective

Objective of this mini project is to install a new network and to minimize the number of entries to be placed in the routing tables to reach newly created network.

2 Exercise 1: Choice of addresses

2.1 Question 1

- From the given figure one can see that 4 subnetworks need to be installed:
  (a) Subnetwork 1 has 13 hosts and 1 port (indicated by number 5), so 16 IP addresses needed for subnetwork 1 (+2 Network, Broadcast addresses)
  (b) Subnetwork 2 has 5 hosts and 1 port (indicated by number 6), so 8 IP addresses needed for Subnetwork 2 taking into account Network and Broadcast addresses.
  (c) Subnetwork 3 has 2 ports (indicated by numbers 1 and 2), so 4 IP addresses needed for Subnetwork 3 for the same reason.
  (d) Subnetwork 4 also has 2 ports (indicated by numbers 3 and 4), then 4 IP addresses needed for Subnetwork 4 as well.

  To sum it up, a block of 16+8+4+4=32 free addresses is needed to create a new set.

- Network address of new network is 193.137.1.0/27. As we only need 32 (32=2**5) free spaces, only 5 bits of host bits will be used. So with the remaining 3 (8-5) bits and 24 network bits the mask is 27.

2.2 Question 2

Subnetwork 3 requires a /30 (255.255.255.252) mask to support 2 hosts (the ends of dedicated link 1). So, network address of Subnetwork 3 is 193.137.1.0/30.

2.3 Question 3

Assigning smallest IP address of Subnetwork 3 to port 1 gives 193.137.1.1. Assigning largest IP address of Subnetwork 3 to port 2 gives 193.137.1.2.

2.4 Question 4

Similarly subnetwork 4 also requires a /30 (255.255.255.252) mask to support 2 hosts (the ends of dedicated link 2). So after assigning first subnetwork. Network address of Subnetwork 4 is 193.137.1.4/30 (since 193.137.1.3 is the Broadcast address for subnetwork 3).

2.5 Question 5

Assigning the smallest and largest IP adressess to port 3 and 4, gives respectively 193.137.1.5 for the port of router "hinge" and 193.137.1.6 for the port of router "arrival".

2.6 Question 6

After assigning addresses for subnetwork 3 and 4, we stopped at the address 193.137.1.7 which is the Broadcast address of subnetwork 4.

- So it means the first available address from now on is 193.137.1.8.
- We decided to start addressing with subnetwork 2, because of the following reason: If we start the assignment with subnetwork 1, then the address range would be 193.137.1.8-193.137.1.23. Since these 2 addresses belong to different subnets, this order is incorrect. We wouldn't have any such kind of problem if we assign first the subnetwork 2.

2.7 Question 7

- After deciding about the order of assigning the addresses for the subnetwork 1 or subnetwork 2, one can get that the subnetwork address for subnetwork 1 is 193.137.1.16.
- After the last assignment the smallest available address is 193.137.1.17 which becomes the address for the port number 5 of the "hinge" router.

2.8 Question 8

- From Question 6, we can say that that subnetwork address for subnetwork 2 is 193.137.1.8. Because we decided to assign addresses firstly for subnetwork 2.
- After the previous assignment the smallest available address is 193.137.1.9, which becomes the address for the port number 6 of the "arrival" router.

2.9 Summary

Below you can see the summary of our choice of addresses:

SubNet Name	Network ID	Mask	IP Range	Usable hosts	Broadcast ID
Subnetwork 3	193.137.1.0	/30	193.137.1.1- 193.137.1.2	2	193.137.1.3
Subnetwork 4	193.137.1.4	/30	193.137.1.5- 193.137.1.6	2	193.137.1.7
Subnetwork 2	193.137.1.8	/29	193.137.1.9- 193.137.1.14	6	193.137.1.15
Subnetwork 1	193.137.1.16	/28	193.137.1.17-193.137.1.30	14	193.137.1.31

3 Exercise 2: Building routing tables

3.1 Question 1

Routing table of a host in Subnetwork 1

Destination	Mask	Gateway
193.137.1.0	/30	charniere
193.137.1.8	/29	charniere
193.137.1.4	/30	charniere
0.0.0.0	/0	-

3.2 Question 2

Routing table of router 'Base'

Destination	Mask	Gateway	Type
193.137.1.16	/28	charniere	remote
193.137.1.8	/29	charniere	remote
193.137.1.0	/30	-	local
193.137.1.4	/30	charniere	remote
0.0.0.0	/0	-	-

Access to the addresses of IP subnetwork 1 (in order too send test packets, etc) is carried out via port 1 which plays the role of interface in order to perform these processes.

3.3 Question 3

Routing table of router 'Charniere'

Destination	Mask	Gateway	Type	Interface
193.137.1.16	/28	-	Local	5
193.137.1.8	/29	Arrival	Remote	3
193.137.1.0	/30	-	Local	2
193.137.1.4	/30	-	Local	3
0.0.0.0	/0	-	-	-

3.4 Question 4

Routing table of router 'Arrive'

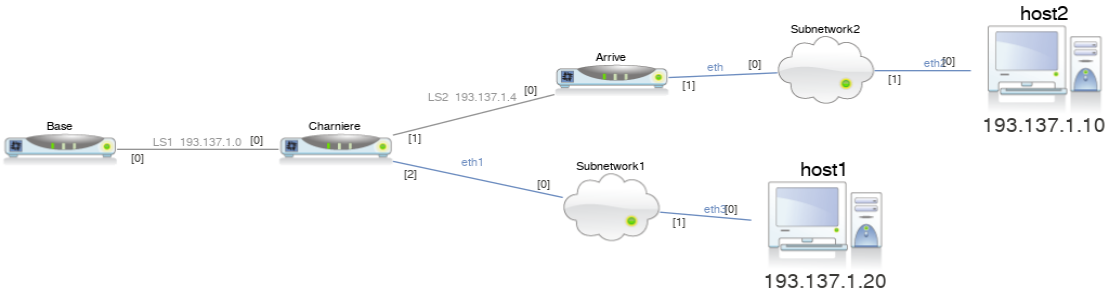
Destination	Mask	Gateway	Type	Interface
193.137.1.16	/28	charniere	Remote	4
193.137.1.8	/29	-	Local	6
193.137.1.0	/30	charniere	Remote	4
193.137.1.4	/30	-	Local	4
0.0.0.0	/0	-	-	-

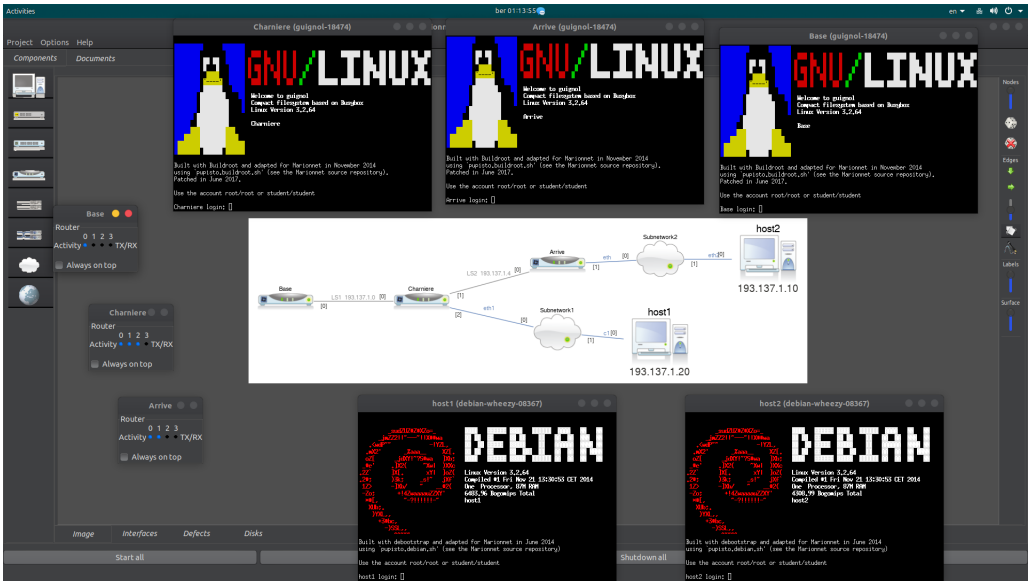
3.5 Question 5

- This addressing plan seems to be satisfactory since we were able to minimize the number of entries to placed in the routing tables.
- Since we are adding all subnetworks of our set to our routing table, the new set of 2 subnets just would increase the number of entries in our table by 2.

4 Exercise 3: Simulation

Simulation of newly created network is done using Marionnet software. From the green lights on all our devices we conclude that our network is working correctly.


host2
Subnetwork2
Arrive
eth
[0]
[1]
eth2
LS2 193.137.1.4
Base
LS1 193.137.1.0
Charniere
eth1
Subnetwork1
host1
193.137.1.10
193.137.1.20


Charniere (guignol-18474)
Arrive (guignol-18474)
Base (guignol-18474)
GNU/LINUX
host1 (debian-wheezy-08367)
host2 (debian-wheezy-08367)
DEBIAN
193.137.1.10
193.137.1.20