CT2108 Lab – IPv4 Subnetting

For this lab session we will not be using Wireshark but instead will be working through some problems related to using subnets on an IPv4 network. It is best to try to do these manually as you may not always have access to online tools. However, there are some good online resources available to help and to verify your own calculations. This one is particularly good:

http://jodies.de/ipcalc

Also, the back of this sheet has a printout of some valid IPv4 subnet masks. When you get used to using these you will find it easier to remember these and to derive them if necessary as they do follow a numbering sequence.

Part A

Assume that you are working for a large multinational company that wants to use the private IP address range 10.0.0.0/8 for its global internal network. The company management wants the network to be able to accommodate operations in up to 64 locations worldwide where each location has its own routed subnet. You are requested to design the network layout. Answer the following questions and try to understand fully the logic behind each answer:

1. If we did not subnet this network, then how many individual host addresses would be available in the full /8 network?

2. What subnet mask will need to be used to fulfill the goal of having up to 64 routed global subnets?

3. How many host IP addresses will then be potentially available at each global location?

4. What are the valid host and broadcast addresses for the first and second global subnets?

Part B

Assume that the company has one of its worldwide locations in Galway and that the internal network in the Galway location needs to be further subdivided into 16 different Departments where each Department has its own routed subnet. The Galway location is routed the third of the available global subnets. Answer the following questions and try to understand fully the logic behind each answer:

5. What subnet mask will need to be used locally, at the Galway location, to fulfill the goal of having a local subnet for each of the 16 Departments?

6. How many host IP addresses will then be potentially available for each Department in Galway?

7. What are the valid host and broadcast addresses for the first and second local subnets at the Galway location?

IPv4 Network Masks

	Host Addresses	Netmask
/31	2	255.255.255.254
/30	4	255.255.255.252
/29	8	255.255.255.248
/28	16	255.255.255.240
/27	32	255.255.255.224
/26	64	255.255.255.192
/25	128	255.255.255.128
/24	256	255.255.255.0
/23	512	255.255.254.0
/22	1024	255.255.252.0
/21	2048	255.255.248.0
/20	4096	255.255.240.0
/19	8192	255.255.224.0
/18	16384	255.255.192.0
/17	32768	255.255.128.0
/16	65536	255.255.0.0
/15	131072	255.254.0.0
/14	262144	255.252.0.0
/13	524288	255.248.0.0
/12	1048576	255.240.0.0
/11	2097152	255.224.0.0
/10	4194304	255.192.0.0
/9	8388608	255.128.0.0
/8	16777216	255.0.0.0