EE3009 Tutorial 5

(VC Network, IP address, subnet, fragmentation)

Review Questions

- Do routers have IP addresses? If so, how many?
- What is the 32-bit binary equivalent of the IP address 223.1.3.27?

Problem

1. Consider a VC network with a 2-bit field for the VC number. Suppose that the network wants to set up a VC over four links: link A, link B, link C, and link D. Suppose that each of these links is currently carrying two other VCs, and the VC numbers of these other VCs are as follows:

Link A	Link B	Link C	Link D
00	01	10	11
01	10	11	00

   a) If each VC is required to use the same VC number on all links along its path, what VC number could be assigned to the new VC?

   b) If each VC is permitted to have different VC numbers in the different links along its path (so that forwarding table must perform VC translation), how many different combinations of four VC numbers (one for each of the four links) could be used?

2. Consider a datagram network using 8-bit host addresses. Suppose a router uses longest prefix matching and has the following forwarding table:

Prefix Match	Interface
1	0
11	1
111	2
otherwise	3

   For each of the four interfaces, give the associated range of the destination host addresses and the number of addresses in the range.

3. Consider sending a 3,000-byte datagram into a link that has an MTU of 500 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the sizes of the fragments and what are the values in their header fields?

Computer Exercise

4. In this exercise, you will subnet a given address space and use Packet Tracer to configure network devices. Open the file "`Subnet_Router_Config.pka`", and follow the instructions.
   a) In Task 1, divide the address space into eight subnets. Assign the second subnet to the network attached to R1. Assign the third subnet to the link between R1 and R2. Assign the fourth subnet to the network attached to R2. (Note that the network prefixes of the three subnetworks are required to be of the same length.)
   b) In Task 2, complete the following addressing table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0			---
	S0/0/0			---
R2	Fa0/0			---
	S0/0/0			---
PC1	NIC			
PC2	NIC			

   c) After you finish Task 3, your completion rate should be 100%. Show it to your tutor.
   d) Verify the configurations by completing Task 4.