Computer Networks Group

University of Göttingen, Germany

Homework #4
(Due on 12:00am, Thursday, Nov. 20th, 2014)

• Why is the Internet Protocol (IP) described as the "narrow waist" of the network stack? What are the advantages and disadvantages of such an architecture?

• What are the two key functions of the network layer that each router performs? Please explain the difference between them.

• Which entity residing in a router is responsible for redirecting data from an input port to an output port? What are the different types of this entity?

• What is buffering, where does it occur and what are possible consequences of this situation?

• Assume you have a 4,000 byte long datagram which needs to be fragmented for a 1,500 bytes MTU. Please fill the following table:

Datagram Number	Length	Fragmentation Flag	Offset

The original 1,400 bytes MTU doesn't make sense, for that it is unable to generate correct offset value due to that 1,400/ 8 is not equal to an integer. We have corrected it into 1,500 bytes. The solution part of this problem is updated. Please refer!

• Convert the following IP addresses into their binary notion:
◦ 134.76.249.227
◦ 192.168.0.1

• Convert the following IP address into it's decimal notion
◦ 11100011000011000001111110101010

- A provider has been assigned the network 128.30.0.0/23 and wants to divide it among three customers. Customer A needs to accommodate up to 220 hosts, customer B needs to accommodate up to 110 hosts and customer C needs to accommodate up to 80 hosts. Please fill the following table with the details of the sub-networks that the provider can create to fit its customers' needs.

Subnet No.	Network Address	Netmask	Host range	No. of Hosts
1				
2				
3				
4				
5				

- Consider IP addresses: How does a host get an IP address? How does a network get the subnet part of an IP address? How does a provider get a block of IP addresses? What is the principle behind these procedures?

- What problem is tackled by Network Address Translation (NAT)? Please briefly describe what NAT does and what the NAT traversal problem is.

- Consider IPv6. What are the main differences between IPv4 and IPv6? What are two approaches towards the transition between IPv4 and IPv6?