In the name of god

Assignment #2: IP routing & forwarding, exercise 1 & 2 – book chapter 6 – deadline ??

Assignment #3: fragmentation & ARP, exercise 3 & 4 – book chapter 7 & 8 – deadline ??

Assume the following network is maintained by an administrator. It is assumed that routing tables of all routers have converged now. Suppose the network is stable and no link failure is occurred for all exercises.

1. Routing tables

a) For each router of the figure, draw its routing table.
b) Draw the routing table of host-A and host-B in the figure.

2. Packet forwarding

In all of following exercises, the host-A wants to send data of 45000 bytes to the Host-B. For this exercise, suppose the MTU (Maximum Transfer Unit) of all links in the network are more than 45000.

a) Draw the IP datagram to be sent to the destination (at source).
b) Obtain the route of the packet to the destination following the routers step by step. Explain how the appropriate next hop is selected in each hop using routing tables.
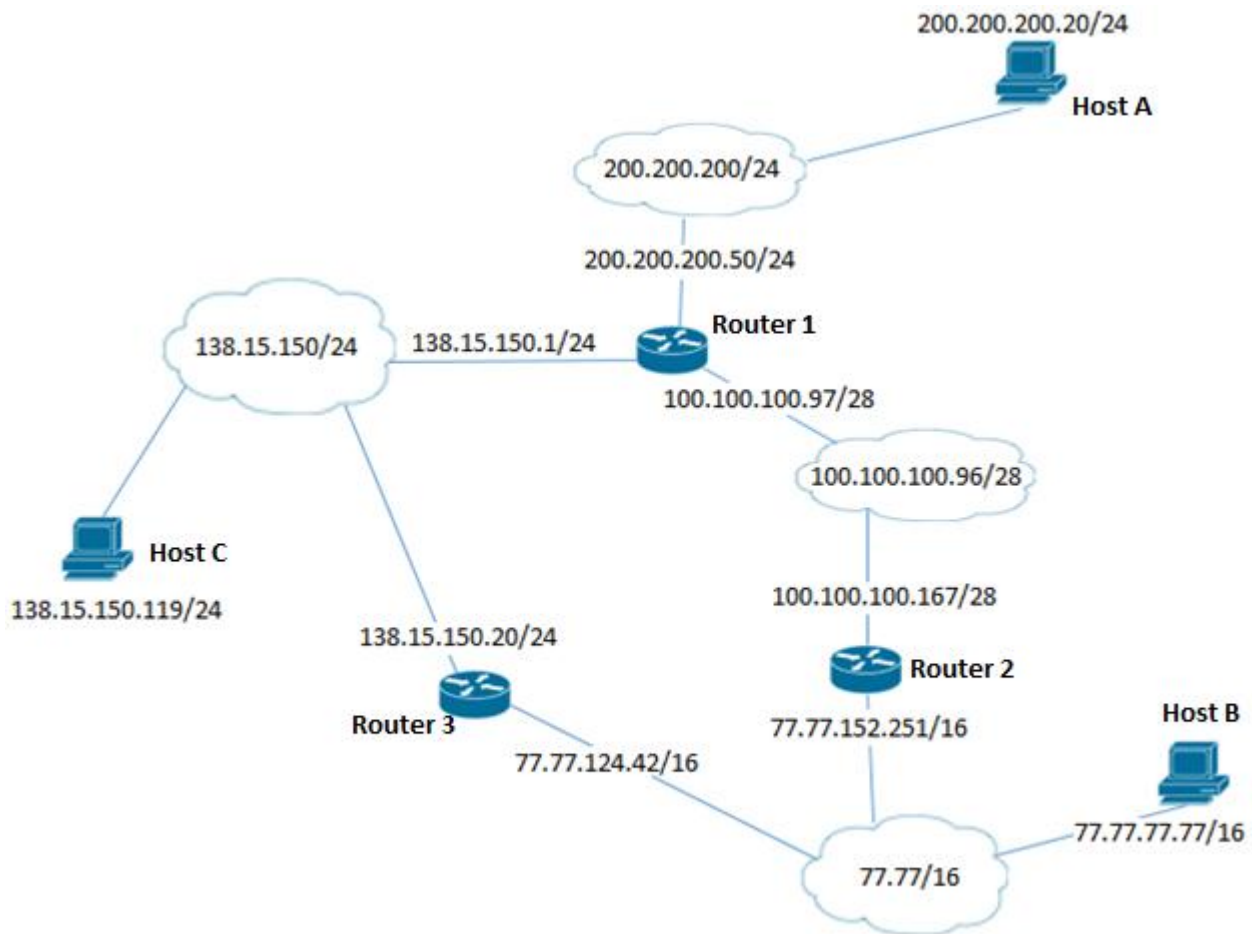
3. Fragmentation

In the second step, pay attention to MTU indicated on each link in the figure.

a) Are data packets originated from host-A to host-B are fragmented? Draw all fragments passing through each link on the route, précising the fields changed by each router.

4. Encapsulation & ARP

Assume all ARP tables are empty now in the network.

a) Encapsulate the data packet obtained at 2.a in an Ethernet frame. What are you going to set in destination MAC address field? How this information is obtained?
b) Obtain the ARP messages exchanged to obtain the destination MAC address (at source network).
c) Obtain the ARP messages and cache tables produced in the network for this transmission. Encapsulate all packets obtained in exercise 3 in a data link layer frame.

200.200.200.20/24

Host A

200.200.200/24

200.200.200.50/24

Router 1

138.15.150/24   138.15.150.1/24

100.100.100.97/28

100.100.100.96/28

Host C

100.100.100.167/28

138.15.150.119/24

138.15.150.20/24

Router 2

Router 3   77.77.152.251/16

Host B

77.77.124.42/16

77.77.77.77/16

77.77/16

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Networks properties

Network	MTU (bytes)
200.200.200/24	65535
138.15.150/24	4464
100.100.100.96/28	17914
77.77/16	1500

Devices	MAC Address
Router 1	00-10-5A-44-12-B5
Router 2	00-30-05-73-C2-3D
Router 3	00-13-00-E1-11-11
Host A	00-60-B3-6C-BF-A2
Host B	00-23-32-DD-26-8A
Host C	00-C0-9F-A1-9D-4A

ARP Packet

Hardware Type		Protocol Type
Hardware length	Protocol length	Operation Request 1, Reply 2
Sender hardware address (For example, 6 bytes for Ethernet)		
Sender protocol address (For example, 4 bytes for IP)		
Target hardware address (For example, 6 bytes for Ethernet) (It is not filled in a request)		
Target protocol address (For example, 4 bytes for IP)		

RARP Packet

Hardware type		Protocol type
Hardware length	Protocol length	Operation Request 3, Reply 4
Sender hardware address (For example, 6 bytes for Ethernet)		
Sender protocol address (For example, 4 bytes for IP) (It is not filled for request)		
Target hardware address (For example, 6 bytes for Ethernet) (It is not filled for request)		
Target protocol address (For example, 4 bytes for IP) (It is not filled for request)		

Ethernet packet

Preamble 7 octets	SFD 1 octet	MAC destination 6 octets	MAC source 6 octets	length 2 octets	CRC 4 octets
		Payload 46(42) – 1500 octets			

IP Packet