

EL5373 Internet Architecture and Protocols

Review Problems – Set Two

Question 1

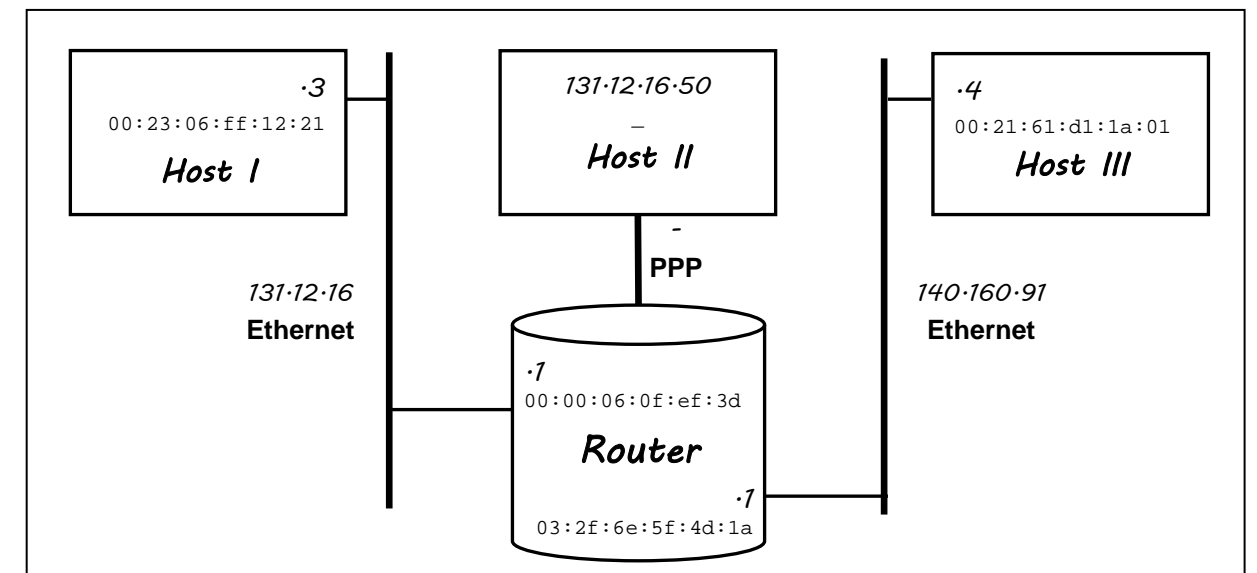
Consider the network shown in the figure below. The IP Address and MAC Address of each interface are given in the figure. Assume ARP caches at the hosts and routers to be empty initially.

Consider the following three events:

- Event 1. *Host I* sends an IP datagram to *Host II*.
- Event 2. 20 s later, *Host II* sends an IP datagram to *Host III*.
- Event 3. 20 s later, *Host III* sends an IP datagram to *Host I*.

Assuming the three events occur in sequence, answer questions below, for each of them.

- a. How many ARP Request-Reply pairs are exchanged?
- b. For each of these ARP Request-Reply pair,
 - i. on which network does the exchange take place? (say PPP, or if Ethernet, give subnet).
 - ii. what is the IP Address being resolved in the ARP Request?
 - iii. what is the resolved MAC Address?
 - iv. who sends the ARP Request, and who sends the ARP Reply?
- c. How many frames are sent when the actual IP datagram is transferred? On which networks are the frames sent? What are the source and destination MAC addresses in each of these frames (if applicable)?
- d. What is the order in which the ARP Requests, Replies, and the frames carrying the actual datagram are sent?



Solution

Since every segment in the network is being observed separately, the same packet going through a segment and then going through another would be looked at as two different frames, for easier presentation of answers.

Answer		Event 1	
a	ARP Request Reply pairs	1	
b	Network used	131. 12. 16	
	IP being resolved	131. 12. 16. 1	
	Resolved MAC	00:00:06:0f:ef:3d	
	ARP Request from	Host I	
	ARP Reply from	Router	
c	No. of frames	2	
	Network used	131. 12. 16	
		Source MAC	Destination MAC
		00:23:06:ff:12:21	00:00:06:0f:ef:3d
	Network used	PPP	
		Source MAC	Destination MAC
		-	-
d	Sequence of events	ARP Req - ARP Rep - IP Frame 1 - IP Frame 2	

Answer		Event 2	
a	ARP Request Reply pairs	1	
b	Network used	140. 160. 91	
	IP being resolved	140. 160. 91. 4	
	Resolved MAC	00:21:61:d1:1a:01	
	ARP Request from	Router	
	ARP Reply from	Host III	
c	No. of frames	2	
	Network used	PPP	
		Source MAC	Destination MAC
		-	-
	Network used	140. 160. 91	
		Source MAC	Destination MAC
		03:2f:6e:5f:4d:1a	00:21:61:d1:1a:01
d	Sequence of events	IP Frame I - ARP Req - ARP Rep - IP Frame 2	

Answer		Event 3	
a	ARP Request Reply pairs	0	
b	Network used	–	
	IP being resolved	–	
	Resolved MAC	–	
	ARP Request from	–	
	ARP Reply from	–	
c	No. of frames	2	
	Network used	140.160.91	
		Source MAC	Destination MAC
		00:21:61:d1:1a:01	03:2f:6e:5f:4d:1a
	Network used	131.12.16	
		Source MAC	Destination MAC
		00:00:06:0f:ef:3d	00:23:06:ff:12:21
d	Sequence of events	IP Frame 1 – IP Frame 2	

Question 2

What is the difference between RARP, BOOTP and DHCP?
 [Refer to your Text Book and www.ietf.org to answer this question.]

Solution

Difference between RARP and BOOTP:

1. The result of an RARP is an IP Address while BOOTP results in other information as well.
2. RARP works in one LAN only, whereas BOOTP works across different subnets.

Difference between BOOTP and DHCP:

1. DHCP specifies a lease period for IP Address usage, and upon expiration of this period, the IP can be used by another client.
2. DHCP can acquire all IP related configuration information, more than in BOOTP.