

1 Multiple Choice

(1) Which protocol does a host use to learn its own IP address?

- (a) DHCP
- (b) DNS
- (c) ARP
- (d) ICMP
- (e) None of these

(2) Which protocol does a host use to learn its own MAC address?

- (a) DHCP
- (b) DNS
- (c) ARP
- (d) ICMP
- (e) None of these

(3) Which protocol does a host use to learn the MAC address of another host on the same network?

- (a) DHCP
- (b) DNS
- (c) ARP
- (d) ICMP
- (e) None of these

(4) DHCP is a protocol in which of the following layers?

- (a) Physical
- (b) Datalink
- (c) Network
- (d) Transport
- (e) Application

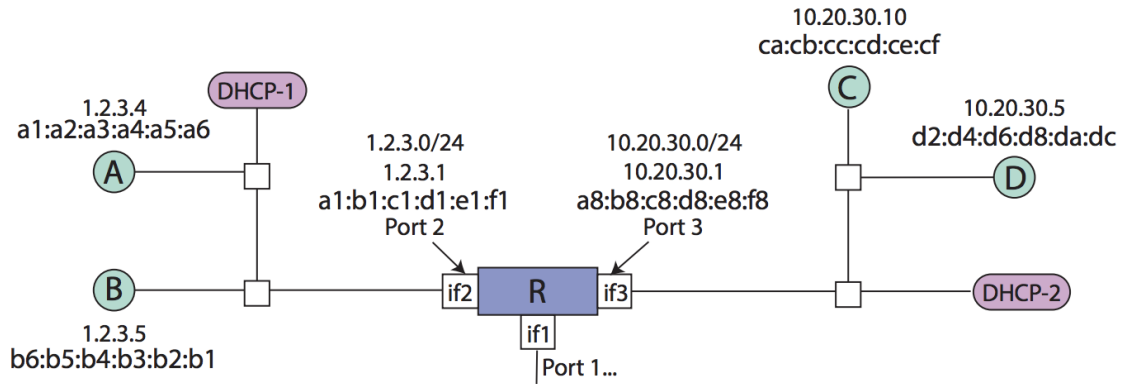
(5) ARP is a protocol in which of the following layers?

- (a) Physical
- (b) Datalink
- (c) Network
- (d) Transport
- (e) Application

(6) Which of the following can a host learn with DHCP? Select all that apply.

- (a) Its own MAC address.
- (b) Its own IP address.
- (c) The MAC address of another host.
- (d) The IP address of another host.
- (e) The IP address of its first-hop router.
- (f) The MAC address of its first-hop router.
- (g) Its own subnet mask.

2 Host-to-Host



Consider the above topology. Here, two networks are connected through router *R*. *R* has three interfaces, each associated with a port, MAC address, IP address, and subnet.

We are going to consider what happens when *A* sends a packet to *C*. Assume that *A* just attached to the network, but already knows the IP address of *C* (10.20.30.10). No hosts or routers have sent any previous ARP requests.

- (1) First *A* needs to learn its own IP address, subnet mask, and the IP of its first-hop router by using DHCP. For each of the following DHCP messages, indicate the messages timing in the packet exchange (1 is first, 4 is last), who sends the message, and whether the message is broadcast or unicast.

Message	Order	Sender	Message Type
<i>DHCP request</i>	1 / 2 / 3 / 4	Client / Server	Broadcast / Unicast
<i>DHCP ACK</i>	1 / 2 / 3 / 4	Client / Server	Broadcast / Unicast
<i>DHCP discovery</i>	1 / 2 / 3 / 4	Client / Server	Broadcast / Unicast
<i>DHCP offer</i>	1 / 2 / 3 / 4	Client / Server	Broadcast / Unicast

- (2) Using this information, how does *A* determine if *C* is on the same subnet?
- (3) Given that *C* is not on the same subnet as *A*, *A* must send the packet to its first hop router *R*. Which requests and responses are exchanged before this can happen?

Request

ARP request for 1.2.3.4
 ARP request for 1.2.3.1
 ARP request for 10.20.30.10
 ARP request for a1:a2:a3:a4:a5:a6
 ARP request for a1:b1:c1:d1:e1:f1
 ARP request for ca:cb:cc:cd:ce:cf

Response

ARP response: 1.2.3.4
 ARP response: 1.2.3.1
 ARP response: 10.20.30.10
 ARP response: a1:a2:a3:a4:a5:a6
 ARP response: a1:b1:c1:d1:e1:f1
 ARP response: ca:cb:cc:cd:ce:cf

(4) Is the ARP request broadcast or unicast? What about the ARP response?

(5) In the packet *A* now sends to *R*, what are the source and destination IP and MAC addresses?

Source IP: _____

Source MAC: _____

Destination IP: _____

Destination MAC: _____

(6) How does *R* know which interface to forward *A*'s packet on?

(7) Now *R* has the packet. List all remaining packets that are exchanged until *C* receives the packet from *A*.

(8) What are the source and destination IP and MAC addresses for the packet that *R* sends to *C*?

Source IP: _____

Source MAC: _____

Destination IP: _____

Destination MAC: _____