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Nevin Liang PROBLEM 1

1. [D] NAT deals with port #s that are part of transport layer, which violates the separation of layers principle.

2. [D] DHCP can do all other.

3. [B] IPv6 has no checksum

4. [C]

5. 3000-20 = 2980
MTU = 700 → 700-20 = 680 = x8 so
680+680+680+680+680 = 2720
260
700+20 = 260 [C]

6. soft state protocols: ARP, DHCP
DNS or IP
DNS has time so IP = [C]

7. [A]

8. ~~A~~BCD [D]

9. [D]

10. A B ~~C~~ D
[B]

11. SKIP

12. [B] 22

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1. No. It cannot. Internet uses TTL to handle packets that traverse over looped routes. TTL is decremented after every router, will die if loops forever.

2. a) DHCP discover
   Src. 222.1.7.10
   dst. 255.255.255.255.

   b) DHCP offer
   src. 222.1.7.1
   dst 255.255.255.255.

   c) DHCP request
   src: 222.1.7.10
   dst: 255.255.255.255

5. TCP ACK is across end systems (many many hops). Link layer ACK (like in WiFi) is only across 1 hop so they do very diff things.

   These two are diff layers they acknowledge diff things and both are needed.

   Wifi ACK is only to ensure delivery between two close systems while TCP is end delivery goal

3. $Np(1-p)^{N-1}$ $N=5$

$$\frac{d}{dp}\left(5p(1-p)^4\right) = 5p\,4(1-p)^3\cdot(-1) + 5(1-p)^4 = 0$$

$$4p(1-p)^3 = (1-p)^4$$

$$5p = 1 \rightarrow p = \boxed{0.2}$$

4. We cannot immediately switch all IPv4 to IPv6. We can slowly upgrade a few at a time. Thus, there must be some IPv4 and some IPv6 at any given point. To create a working internet with both IPv4 and IPv6, we use TUNNELING. IPv6 datagrams carried as payload in IPv4 datagram in IPv4 routers. IPv4 tunnel connects IPv6 routers which allows for slow IPv6 adoption.

CSMA/CA

6. No. 802.11 is not foolproof there are cases where it fails. For example, two nodes contending for channel @ exactly same time AND/OR approximately same time due to propagation delay.

The reason these failures can happen is because CSMA/CA handles collisions by sensing if channel idle for DIFS (then transmit frame) if busy, then backoff using timer (transmit when timer expires) send ACK if ok. this all occurs on central server side so any propagation delay / simultaneous sends would break it.

7. a) No. the path vector in BGP is the AS-level path. then does not include routers IP address.

b) Yes. BGP can detect loops when BGP router receives ~~adv~~ router advertisement, it can detect whether it was already processed & disregard it if it was. (prevents loops).

8. Ping defines uses ARP. to identify MAC address of remote computer.

ICMP is also used.

↳ request & response are literally what ping is and are from ICMP.

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PROBLEM 3

1. 3 protocols for connecting to WiFi and getting IP address.

   DHCP, CDMA, 802.11, ARP

2. routing RIP/OSPF/BGP, UDP

3. DNS & UDP
   ↳ for DNS ☺

4. HTTP, TCP

5. inter: eBGP, iBGP
   intra: OSPF, RIP

6. DHCP

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Problem 4.

AS1 → AS2 → AS4

1\. it will take ~~f~~ ~~1i → 1f → 1c → 2d → 2a → 2b → 4b →~~ 4c → X

2\. [f,] because the path through f is the shortest

3\. Router 1e: 1msg 3 neighbors $\frac{60}{30}$ = (6 msg/min)

4\. Router 2h: 1msg · 8 · $\frac{60}{30}$ = (16 msg/min)

5\. AS2's OSPF is better if a link goes down. RIP takes forever to converge when a link goes down

6\. Since 3c is the border host, it used eBGP to learn while 3a uses iBGP to learn. DIFF routing protocols

7\. AS3 → AS5 → AS4

8\. AS5 → AS4

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Problem 5

1. TDMA. uncompetitive as frequency multiplexing load.
2. CSMA/CD for ethernet MAC
   ↳ single collision domain
3. CSMA/CA random access for wireless
4. polling MAC protocol.

1. Single ethernet bad b/c many collisions. 40 AP, many switches, ONE ethernet = way too much.

2. a) self-learning @ each switch
No change to user device

b) no ethernet plug and play.

c) VLAN could possibly work. Same physical switches but virtually separate

d) WiFi provides inter-AP roaming already, none needed

e) Separate physical ~~VLANs~~ switches w/ as trunk port used

3) a) [Yes] Router will not broadcast packets over diff subnets → reduce packet flooding. better than switches

b) yes, each user device needs to encounter forwarding / routing table here top router must run OSPF

c) ~~WiFi: provides inter-AP roaming, none needed~~ ?!.
diff subnets, so Mobile IP needed. Tunneling also option

7 PAGES

HONOR CODE

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