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Sec - 22

1) a) Source IP = 16  
Destination IP = 12  
Source port = 49152  
Destination port = 80  
Source MAC = H  
Destination MAC = J

Type → well known port [sender port]

- 2) Cookies improve user experience by keeping a user logged in across page requests so that users do not need to reauthenticate on every click. They also store user preference language. Then non-identifying cookies also let sites remember where users left off. Cookies also help servers serve fast cached content optimized per user.
- 3) The email client was configured to use POP3 and was set to delete messages from server after download. POP3 downloads messages into the local client mailbox and removes them from the server so other devices or webmail no longer see them.
- 4) The owner of the connect site can register common type domains and set a DNS A or CNAME record pointing to the same IP or host as google.com. When we request google.com our DNS resolves to the A record or CNAME and we reach the intended web server which can then redirect or serve content.



So DNS simply resolves names to IPs. The mapping `www.google.com`  $\rightarrow$  `IP_A - www.google.com` happens only if `google.com` is configured to point to the same IP or to redirect.

- 5) The receiver advertises in each ACK how much free buffer space it currently has. The sender limits how many bytes it can have to the last advertised ~~round~~ round. If round becomes small or zero the sender must pause sending until the receiver advertises more space. The window slides forward as the receiver consumes buffered data and acknowledges it. The sender increases bytes accordingly. Therefore sender ~~never~~ never overwhelms receiver's buffer. The receiver does not need to drop segments due to overflow.

6) Subnet mask = 255.255.224.0 /16 = 255.255.0.0/19  
 Network address = 173.192.192.6 means 3 bits into third octet

third octet 221 decimal  $\rightarrow$  binary 11011101. keep  
 top 3 bits 110  $\rightarrow$  192 in  
 third octet.

Broadcast address = 173.192.223.255

Range covers third octet 192.223 broadcast is  
 255 at end.

Subnet = ~~173.192~~.255.255.224.0

Network = 173.192.192.0/19

Broadcast = ~~2000~~ 173.192.223.255

7) a) Total RTT = 480 ms.

One way = 15

$\therefore$  RTT =  $2 \times 15 = 30$  ms. obj size = 10 MB

no of obj =  $\frac{480}{30} = 16$  objects. (A)

b) 10 MB =  $10 \times 8 = 80$  M bits

Time =  $\frac{80}{80} = 1$  s = 1000 ms (A)



8) a) S1 starts at 5044 length 399  $\rightarrow$  next =  $5044 + 399 = 5443$   
 S2 starts at 5443 11 120  $\rightarrow$  next =  $5443 + 120 = 5563$   
 S3 starts at 5563.

Client bytes sent so far to be acked by server.

$C1(125) + C2(244) = 369$  bytes after seq 1024  
 $\rightarrow$  next expected client  
 byte =  $1024 + 369 = 1393$

seq no = ~~5563~~ 5563 ack = 1393.

b) ACK-1 is the client ack after receiving S1  
 After S1 the next server byte is  $5044 + 399 = 5443$ .  
 so client will ACK 5443.  
 ACK-1 ack = 5443

c) Under selective repeat the receiver acknowledges each segment independently by sequence number of next byte after that segment. S3 starts at 5563 and is 40 bytes long  $\rightarrow$  next byte =  $5563 + 40 = 5973$   
 so ACK-3 = 5973.