

physical  $\rightarrow$

$$\text{Seq} = 9667$$

$$\text{ACK} = 5550 + 568$$

$$\text{twind} = 8088 - 568 - 266 - 123$$

transferring object received 78 duration = 100ms DNS

$$= 100 \times 8 + 9.29 =$$

$$\text{OP} = 806 \text{ ms}$$

### Summary - 22 (A)

(i)(i) As time limit did not exceed . So it will be 80ms.

~~Ques~~ (ii) IP address received , so no DNS query .

$$\text{OP} \cdot \text{RTT} = 25 \times 2 = 50 \text{ ms}$$

To fetch all the objects  $= (50 \times 12) + (50 \times 12)$   
 $= 1200 \text{ ms}$ .

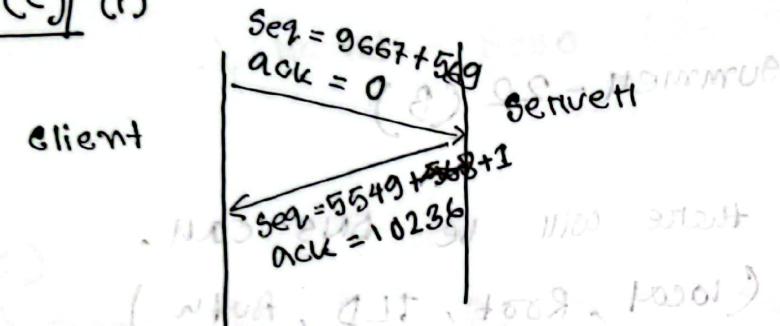
(iii) total time to fetch the object  $= 1200 \text{ ms}$   
DNS Query  $= 50 \text{ ms}$

$\therefore$  total time to unpack everything  $= 12 \times 89$   
 $(0.8 \times 51) + (81 \times 89) = 1020$

$\therefore$  total time to load the page  $= 1200 + 50 + 1020$   
 $= 2270$

2(b) value of HLEN = 1010  
 $\therefore$  in decimal  $= 8+2 = 10$   
 $\therefore$  header length  $= 10 \times 4 = 40$   
 $\therefore$  data length  $= (80 - 40) = 40$

2(c) (i)



$\therefore$  Data segment = 1 ACK = 0      SEQ = 10236      ACK = 10236

acknowledgement number task - that's why we do not have to add Data segment bytes  
 $OFPI + OF = (12 \times 2 \times 8) + (5 \times 8)$

(ii) As it did not receive 2nd segment, so it will only send acknowledgement of 1st segment to the Server.

$$\begin{aligned}
 \text{Sequence} &= 9667 + 568 + 909 = 11235 \\
 \text{acknowledgment} &= 5549 + 1 + 568 = 6118 \\
 \text{window} &= 8000 - 568 - 266 - 123 = 7611
 \end{aligned}$$

3(c) (i) packets needed =  $\lceil \frac{28393.39}{3000} \rceil = 10$

(ii) 3rd last packets MF will be 1, as there is more packet to come. It would be 0 if there is no packet to come.

$$\begin{aligned}
 & \text{up to } 9 \text{ packets of data sent} = (3000 \times 9) = 27000 \\
 \text{(iii)} \quad & \therefore \text{leftover data} = (28939 - 27000) \\
 & \text{OP} = 38 \times 19039 \\
 & \therefore \text{removing header size} = (1939 - 38) = 1901
 \end{aligned}$$

### Summary - 2.2 (B)

1(c) (i) As TTL ended. So there will be DNS call.  
as there is 4 servers (local, Root, TLD, Auth)

So total RTT  $= 55 \times 4 = 220 \text{ ms}$

(ii) It is a persistent HTTP connection.

$$\begin{aligned}
 & \underline{(35 \times 2)} + \underline{(35 \times 2 \times 21)} = 70 + 1470 \\
 & = 1540
 \end{aligned}$$

Time taken by TCP to establish connection  $\downarrow$   
and then by HTTP to download file from server

(iii) Total time to load the page website.

$$\begin{aligned}
 \text{RTT} &= 220 + 1540 + (120 \times 21) \\
 &= 4385
 \end{aligned}$$

Q1 - Tools \ Network - between student (i) | (ii)

if you see L is the number of bytes (iii)

first it is 6100. It is the sum of first 9 bytes  
sum of taking off of

2(c) (i) → same.

- (ii) As it is a go-back connection so it will not accept anything if something goes missing

∴ seq. = 11235 → previous

∴ twnd = 8000 (As first one has been processed)

3(c)

(i) There will be  $\lceil \frac{21739}{2080} \rceil = 11$  packets.

(ii) As it is last packet, so the MF will be 0.

(iii)

[Fall 22 (A)]

1(c) → ~~for latency~~  $\frac{0.08}{2} = 0.04$  s,  $10 \times 2 =$

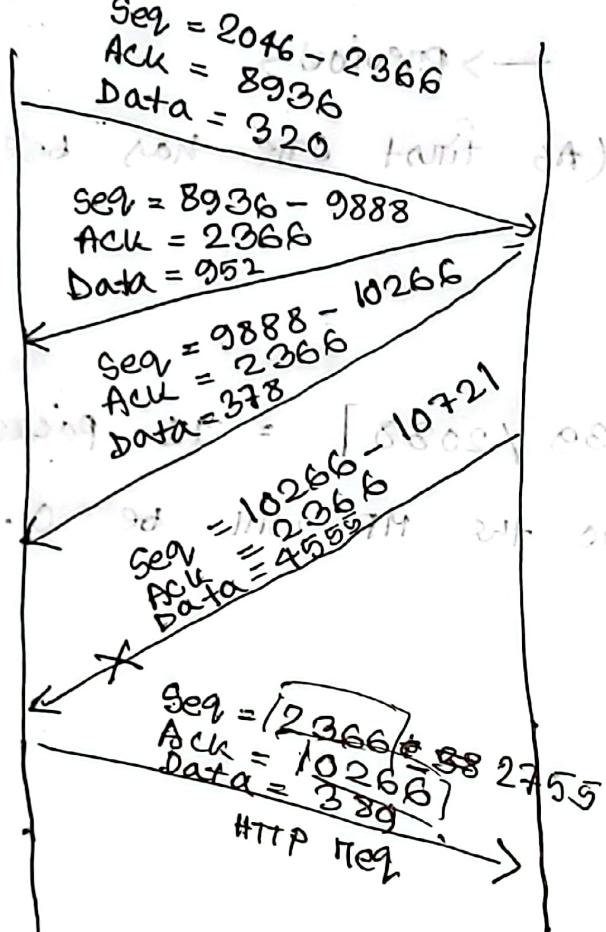
2(c) (i). Total time to fetch DNS =  $10 \times 4 = 76$  ms

(ii)  $(35 \times 2) \xrightarrow{\text{TCP}} + (21 \times 70) \xrightarrow{\text{HTTP}} + (21 \times 5) \xrightarrow{\text{Latency}}$   
= ~~76~~ 1645

(iii) Total times needed  
start to begin to process  
$$\begin{aligned} & \text{Initial} = 0.04 \text{ sec} \\ & = 76 + 1645 + (125 \times 21) \\ & = 4346 \end{aligned}$$

3(b) if will flag make U flag 1. And set the ACKS  
 pointed to  $seq = 3020 + 780 = 3700$ ,  
 because after sending the first packet

3(c) (i)



getver.

(ii)  $seq = 3020 - 300 - 99 = 2621$

(iii) round would

$\lceil (4) \times 18 \rceil$

be

$$= 3020 - 300 - 99$$

$$\approx 2621$$

$$ARDF = p \times 18 = 2621 \text{ not } \approx \text{ with total } 2621$$

(iv) After receiving DS-4

$$\begin{aligned} \text{Seq No} &= 2755 \\ \text{ACK No} &= 10266 \\ \text{Offset} &= 96 \end{aligned}$$

→ Nothing will be changed as there is one packet missing

[Fall 22-B]

$$1(d) \text{ Access delay} = 44 \text{ ms}$$

$$\text{Internet u} = 3.055 = 3050 \text{ ms}$$

$$\text{Lan } \otimes u = 50 \text{ ms}$$

$$\Rightarrow \text{Proxy hit} = 0.6 \times 50 \text{ ms} = 30$$

$$\text{Internet hit} = (44 + 3050 + 30) \times 4 = 1237.6$$

$$\therefore \text{total delay} = (1237.6 + 30) = 1267.6$$

2(c) (i)

$$\text{it would be} = (26 \times 4) = 104 \text{ ms}$$

(ii) the request would be

$$= (39 \times 2 \times 30) \xrightarrow{\text{TCP}} + (39 \times 2 \times 30) \xrightarrow{\text{HTTP}} + (4 \times 30) + 104$$

$$= 4904$$

As it is from the point of requesting website that is why we have to add DNS.

total time

$$= 4904 + (215 \times 30) \xrightarrow{\text{Packet}} \text{latency}$$

$$= 11354 \text{ ms}$$

3(c)

i

Seq = 1769  
Ack = 9857  
Data = 10808

Seq No = 1547  
Ack No = 9857  
Data = 222 bytes

Seq = 1547 9857  
Ack = 9857 + 222 = 10079  
Data = 1547 1769

Seq = 1769  
Ack = 10808  
Data = 11286

Seq = 10808  
Ack = 1769  
Data = 478

Seq = 9857 + 951  
Ack = 1769

Seq = 1769  
Ack = 11286 (ACK)  
Data = 11286 369

Seq = 11286 611  
Ack = 2138

Seq = 11286  
Ack = 2138  
Data = 300 bytes

∴ Data segment = 300 bytes

Ack = 213811

ii) After 5th data segment the window would be =  $1684 - 99 - 20$

$$= 1384$$

iii) Seq = 2138 [Packets = 50] → Because a data packet dropped.  
 ack = 11286  $\rightarrow$  ~~11286 = 50~~ ack. number won't increase  
~~PSS + CTS =~~ ~~sent~~ and client didn't send anything  
 So seq. will also remain same.

[Spring 23 (A)]

2(c) (i) RTT required =  $(2 \times 23 \times 4)$  ms

$$1280 = (2 \times 23) + 2010 = 184 \text{ ms}$$

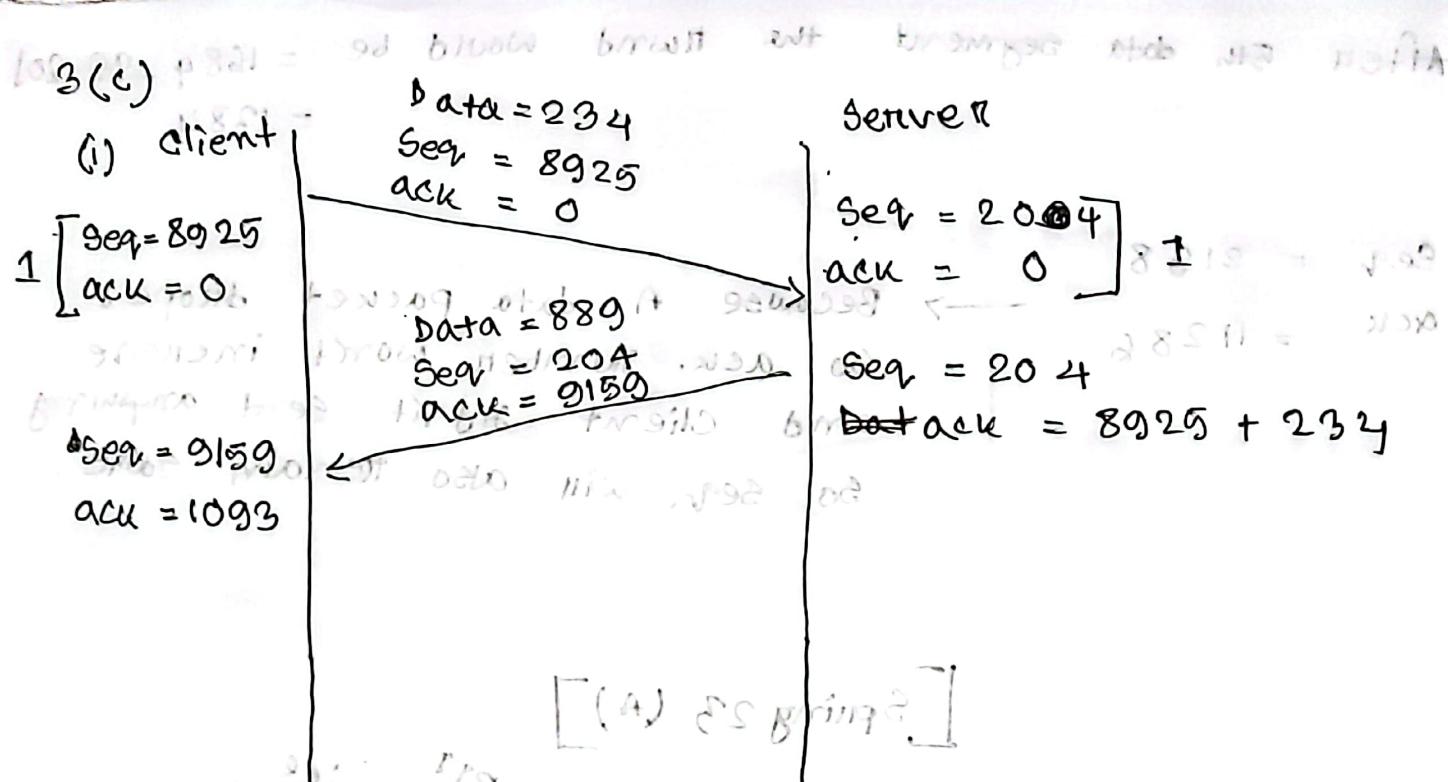
$$10880 = (2 \times 088) + 2001 = 2001$$

(ii) RTT = DNS + TCP + HTTP  
 $= 184 + (30 \times 2) + (30 \times 2 \times 30)$   
 $= 2602 \text{ ms}$

(iii) Total time =  $2058 = \text{File capture RTT} + \text{Delay}$   
 $\Rightarrow \text{Delay} = 5344 - 2602 = 2742 \text{ ms}$

file size =  $12 \times 8 = 96 \text{ Mbits}$   
 $\therefore x = \frac{96 \times 30}{2.742} = 1050.3$

∴ 2nd file size, 3rd file  $\dots$  total.



$\therefore$  Total 4th data Segment = terminated at (ii) [622]

$$\begin{array}{lll} \text{Client} & \text{Seq} = 9159 + (889 \times 3) & = 9861 \\ & \text{ack} = 10933 + (889 \times \frac{2}{3}) & = 28701 \end{array}$$

(ii) For the 13th utfp  $\sin \alpha =$

$$t. \text{ Seq.} = \cancel{10408} (12 \times 234) + 8924 + 1 = 11739$$

$$t. \text{ ACK} = (\cancel{10408} \times 889) + 203 + 1 = 8205$$

$$\begin{aligned}
 \text{(iii) RWND of the client without timer} &= 55,000 - 5 \times 889 \\
 &= 53,611
 \end{aligned}$$

### Spring 23 (B)

1(c) Access link = 123 mbps Lan link = 1023 mbps

$$\text{Server can upload} = 40 \times 4 = 160 \frac{\text{mb}}{\text{byte/s}} \\ = 1680 \frac{\text{mb}}{\text{bytes}}$$

$$= 1680 \times 10^{-6} \text{ mbps}$$

$$\therefore \text{Access utilization} = \frac{160}{1680 \times 10^{-6}} = 1.300 \times 10^6 \approx 130\%$$

$$\text{Protocol time} = 5 \times 20 = 100 \text{ ms}$$

$$\therefore \text{Access Lan u} = \frac{160}{1023} = 15.6\%$$

$$(15.6\%) + (21 \times 15.6\%) + (21 \times 15.6\%)$$

2(c)

$$\underline{i.} \text{ As Nonte's pc already has the DNS stored} \\ = (44 \times 2) = 88 \text{ ms only local DNS query} \\ 88 = (28 + 31) = 119 \text{ ms}$$

$$\underline{ii)} \text{ total time required to capture object} \\ = 88 + (80 \times 2 \times 28) + (80 \times 2 \times 28) \\ = 10056$$

$$\underline{iii)} \text{ total time} = \text{object fetching time} + \text{latency} \\ 10088 =$$

(a) CS Timing

address = unit mod expression with mod (Q)

$\frac{1}{2} \times 1000 = \text{PXOP} = 600 \text{ ms mod}$   
~~at address =~~

address  
summert 23 (A)

$2(2) \times 1000 = \frac{2000}{251} = \text{modulus mod}$

i. it would be  $= 25 \times 2 = 50 \text{ ms}$  as it already fetched by PC-B, 021

~~trick~~ (iii) total time to fetch  $= \text{TCP} + \text{HTTP} + \cancel{\text{file download}}$   
 $= (48 \times 2) + (50 \times 2 \times 18) + (18 \times 123)$

Hence,

~~for both receiving~~ sending between receiving  $= 48 \text{ ms}$   
~~message~~  $= 50 \text{ ms}$

$\therefore \text{one RTT} = (48 + 50) = 98$

$\therefore \text{total} = (98 + (98 \times 18))$

~~for both receiving~~  $= 1862 + (85 \times 2 \times 88) + 88 =$

(iii) Total time  $= 50 + 1862 + (18 \times 123)$

~~for both receiving~~  $= 4128 + 880 = 4908 \text{ ms}$