Name : Md Farhan Ishmam

ID : 180041120

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Course Name : Computer Networks

Final Examination

Ans.to Q.no. 1 [illegible] (a)

(i)

The packet has 43 00 as the first 8 bits. The first 4 means version and second 3 is header length. The header length is 3. So, the header size is 3X4=12 bytes. This is not possible as the ~~packet~~ IPv4 packet has minimum 20 bytes. So, this packet is corrupted. (Ans.)

Md Farhan Ishmam
1800041120

~~Ans to Q.no.~~

(ii)

| | | | |
|---|---|---|---|
| 43 | 00 | 00 | 54 |
| 00 | 03 | 40 | 00 |
| 20 | 06 | 00 | 00 |
| 7C | 4E | 03 | 02 |
| B4 | ~~0~~0E | 0F | 02 |

As there are 5 rows of 32 bits only, there are no options. Size of header is (32x5)=~~0~~160 bits=20 bytes.

Ans: No options.

(iii)

The flag bit has 4→0100.

X D M.
0 1 0

Do not fragment is ~~0~~ 1.

So, the packet is not fragmented.

(iv)

The TTL is 8 bits and is $(20)_{16} = (32)_{10}$.

So, the packet can travel to ~~20 r~~ 32 routers. (Ans.)

## Ans to Q.no. 1(a)

### Comparism between IPv4 Options and IPv6 headers

IPv4 options are added at the last of the IPv4 packet. It can have upto 40 bytes. the structure is

| | | |
|---|---|---|
| 8 bit | 8 bits | Var length |
| Type | Length | Value. |

The options can be no-operation, end ~~of~~ of option, record route, source route and timestamp.

IPv6 extension headers are similar but they point to each other. Padding, fragmentation are extension headers in IPv6. Record route and timestamp are omitted.

Md. Farhan Ishmam
180041120

Ans. to Q no. 1(b)

In IPv4, the service typp field determines the priority. The 6 bits of service type is

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| x | x | x | 0 | 0 | 0 |

If the rightmost 3 bits are 0, the the leftmost 3 bits represent the priority. The priority can range 0 to 7. Lower priority packets are dropped in congestion. In IPv6, the Urgent and PUSH flag can be used for priority / preecedence. The urgent ~~or~~ flag gives the packet higher preecedence in a queue and it can take service first. The push flag is similar and takes service in a congestion queue which is equivalent to having higher preecedence.

## Ans. to Q no. 1(c)

Normally, in an IPv4 ~~packet, the~~ connection, the initial device configuration is done by the network manager or by DHCP. IPv6 can however, automatically configure itself by using the interface identifier and joining FE80:: with in

Link local Address ≑ FE80:: [Interface Identifier]

As, the interface identfier is usually unique the link local address is usually unique. Then ~~a packet is send~~ the host sends a router solicitation message and receives an advertisement. Then combinlng with the link local address, it can make the global unicast address.

Given, block 2000:1456:2474.

Subnet is $(20)_{10}$ → last two digit

$=(14)_{16}$ → last two digit in hexadecimal.

The interface identifier is for (F5-A180|041120) physical address.

Interface Identifier = ~~F7-A1~~

F7A1:80FF:FE04:1120.

The IpV6 address is

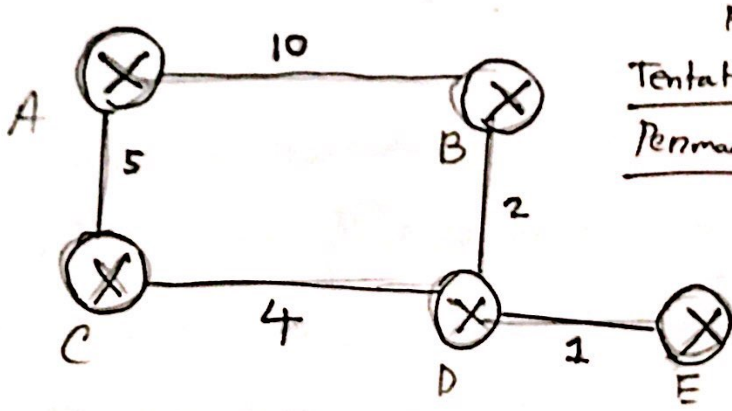
2000;1456:2474:0014:F7A1:80FF:FE04:1120.

## Ans. to Q. no. 2 (a)

Link State Routing protocals has two main features,

- it shares only the information ~~it knows~~ of neighbors.
- it shares to everyone.

The algorithm used is Djikstra's algorithm and the most prominent protocol is the OSPF.



For A,

Tentative : ~~A(0)~~, ~~C(5)~~, ~~B(10)~~, ~~D(9)~~, ~~E(10)~~

Permanent : A(0), C(5), D(9), B(10) E(10)

Here, the routing table of A ~~is~~ will have information of neighbors which will be shared to all the nodes in the network. This is called flooding. The creation of the state of links is called a link state packet. This packet is send to every node via flooding. Afterwards, using djisktra's shortest path algorithm, each node will calculate the shortest path to any othere node and update the routing table.

Differeence between link state and distance vector:

| Link State | Distance Vectors |
|---|---|
| 1) Shares the information of neighbors. | 1) Share everything it knows. |
| 2) Shares to everyone (flooding) | 2) Shares to neighbors only. |
| 3) Uses djikstra's algorithm. | 3) Uses Bellman ford's algorithm. |
| 4) Takes longer times to update the routers/ nodes. | 4) Frequently updates its routers or nodes. |
| 5) Ex - OSPF | 5) Ex - RIPv1, RIPv2. |

Distance Vector used to more popular but now link state routing is gaining popularity in some sectors.

## Ans to Q.no. 2(b)

The ~~first 8 bytes of the~~ IP header in ICMP error message gives us the information about the datagram header which was dropped. In this way the receiver can know what kind of IP packet / datagram was dropped. The first 8 bytes of ~~IP~~ datagram data is included because it includes the header of TCP or UDF. The first 8 bytes contain port number and sequence number. By knowing this, the ICMP receiver can inform the upper layer about the error packet.

Different components of ARP package are –

i) Input Module
ii) Output Module
iii) Cache Control Module
iv) Queues
v) Cache Table.

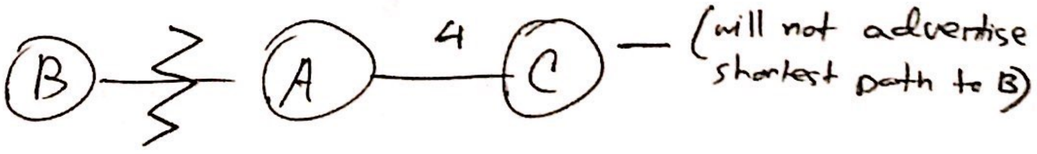
# Ans. to Q. no. 2(c)

The canting to infinity problem (C2I) happens in distance vector routing when a link ~~bet~~ between connected nodes is terminated. This is also called two node instability problem. Solutions are:

1) Defining infinity: Instead of a very large number, we define infinity as a smaller number. Most implementations use 16 as infinity.

2) Hold Down.

3) Split Horizon: If the ~~sender~~ device ~~has a discon~~ who advertised the ~~past~~ shortest path has ~~a~~ announced that the device ~~B~~ it is connected to is unreachable, ~~but~~ then other advertisements of that path will not be ~~ignored~~ done.



Here A advertised that ~~B to~~ it has shortest path to B. When A says B is unreachable, advertisement from C will ~~be ignored~~ not be done. C WILL NOT advertise path to B.

4) Split Horizon and Poisson Reverse: Instead of C being idle and not advertising anything, C will advertise after ~~som~~ some time that distance to B is infinity. This negative feed back after some time is Poisson Reverse.

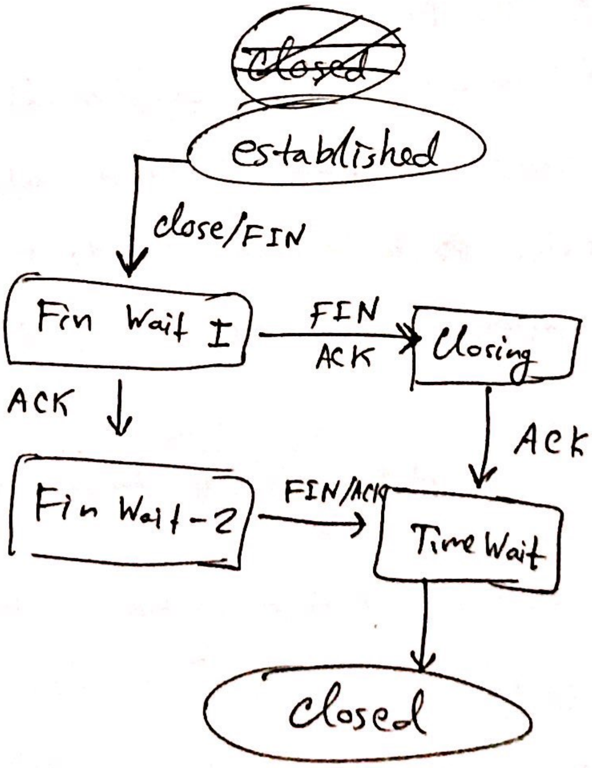
In path vector routing, a similar looping problem is seen and it can use the same solutions to solve it.

## Ans. to Q.no.3(a)

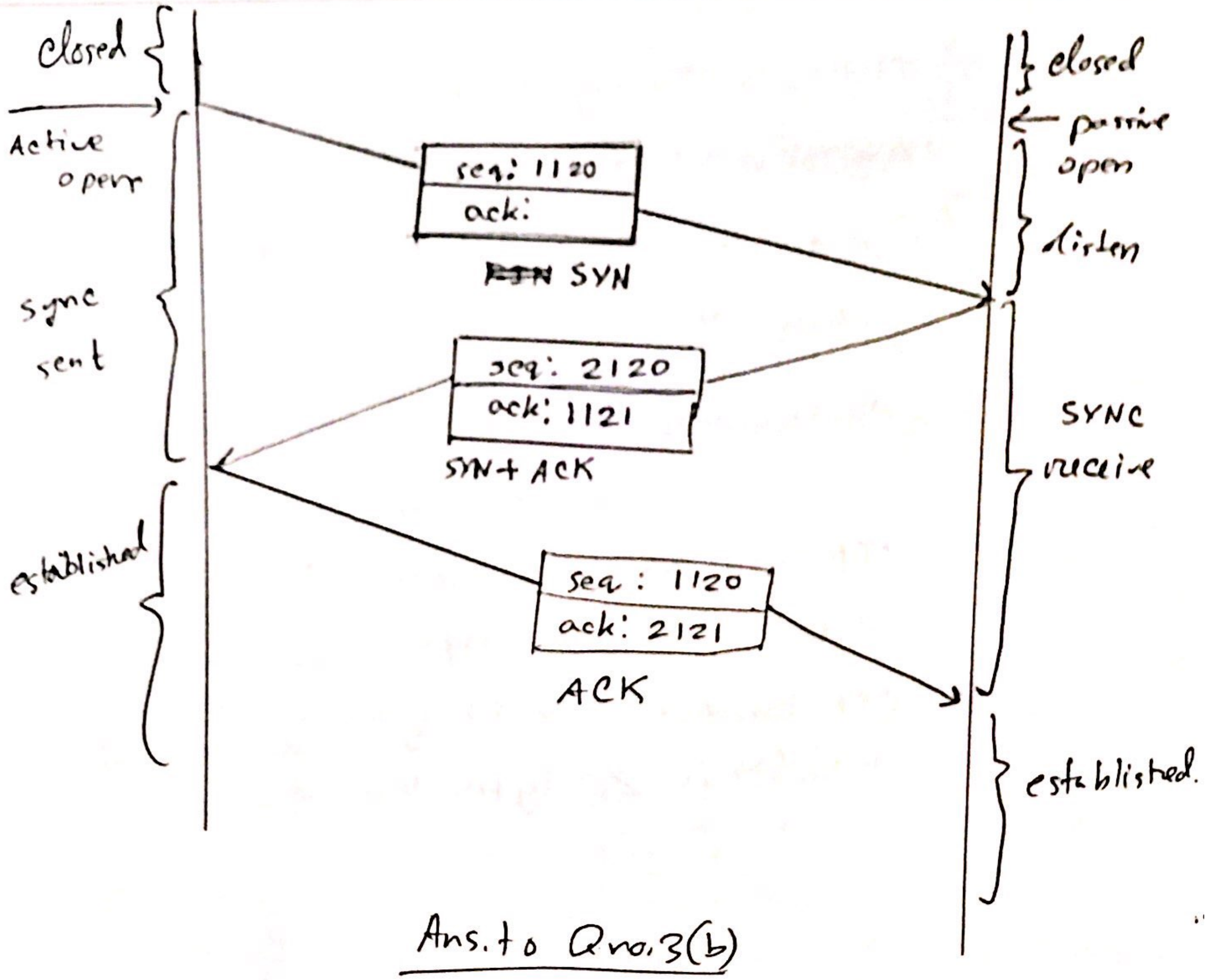
client ISN = 1120 (last 2 digits)

~~TCP~~ server ISN = 1120 + 1000 ~~= 1020~~
= 2120

The state tranisition diagram of half close termination is given below:



In this state first the ~~os~~ established connection goes to FIN Wait-I when the client send FIN. Then after acknowledged it goes to FIN-Wait-II. Which is then after receiving a FIN/wait from server will go to Time-Wait for graceful termination and is finally closed.



## Ans. to Q.no. 3(b)

SCTP stands for ~~strneam~~ stream contral transmission protocal. TCP is byte oriented and ~~not~~ reliable. UDP is message oriented and unreliable. SCTP is the combination of TCP and UDP. It is message oriented and reliable. It also has other features such as multistreaming and multihoming.

An SCTP packet has major differences with TCP packet. They are:

1) Contral information of TCP is part of header but it is in contral chunks of SCTP.

2) TCP can carry single data payload but SCTP has several data in data chunks.

3) Options are part of TCP header but SCTP has option chunks.

4) Checksum is 32 bits in SCTP ~~but~~ but only 16 bits in TCP.

5) SCTP uses association instead of establishing connection and has verification tags, in header.

6) SCTP header is 12 bytes for base but TCP header is 20 bytes base header.

Md. Farhan Ishmam

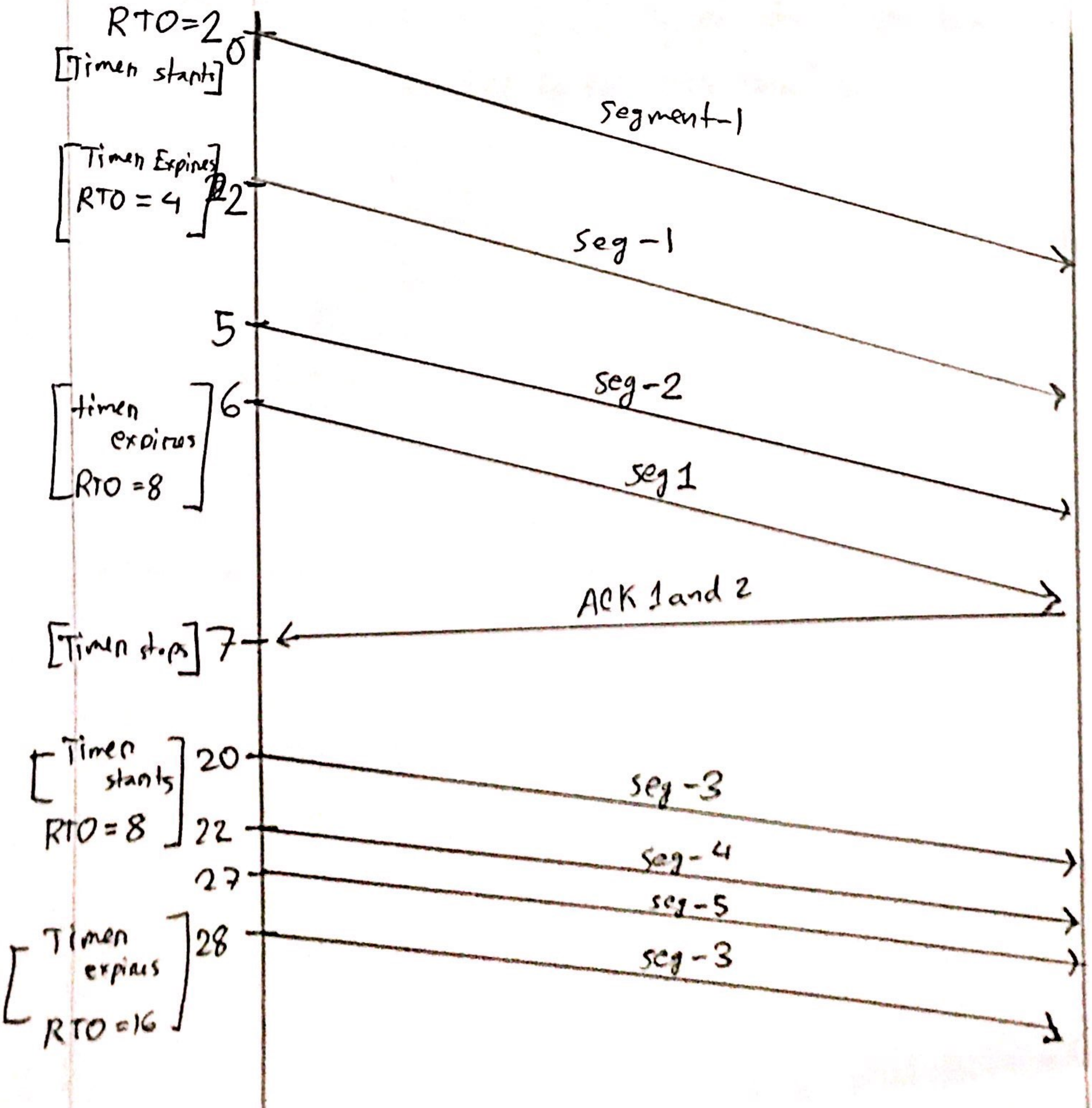
180041120

## Ans. to Qno. 3(c)

Last 2 digits of ID = (20 mod 10) + 2

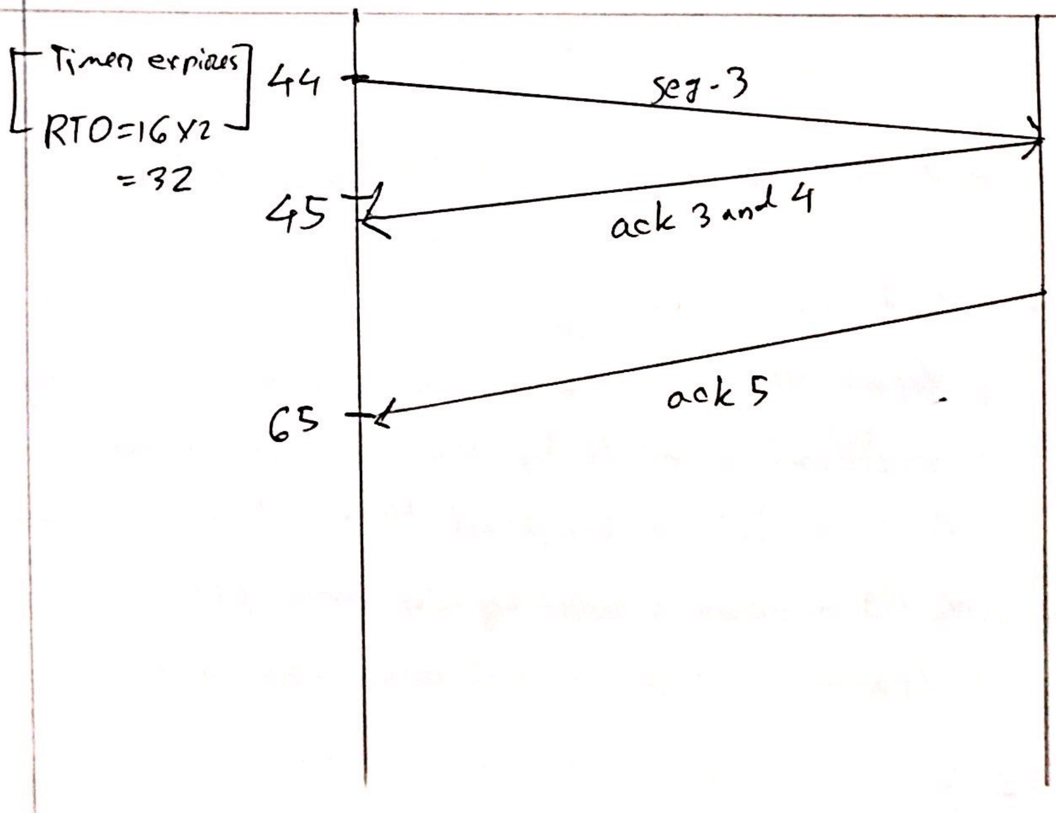
= 2

Time-Wait timer: for graceful termination, after sending ACK by client, the client waits for time before closing. Then, if a reconnection is made by the server, it will be received. Or, if ACK packet is dropped then client can ~~resend, the~~ get the FIN from server again and perform graceful termination.



Md Farhan Ishmam

180041120


Timer expires
RTO=16x2
=32
44
seg-3
45
ack 3 and 4
65
ack 5