PART – C

Transaction
IP

11.

~~Version~~ ~~Hadde~~	addr ~~Htype~~	type ~~HLen~~	HLen
client address			
~~server~~ your address			
server address			
grant address			
client network address			
Name Options			

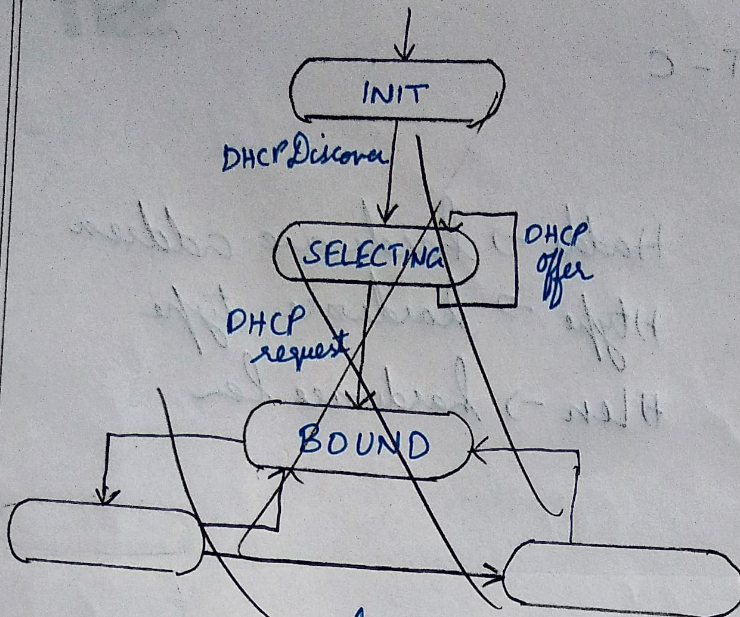
Hadde → hardware address
Htype → hardware type
HLen → hardware len

Options →

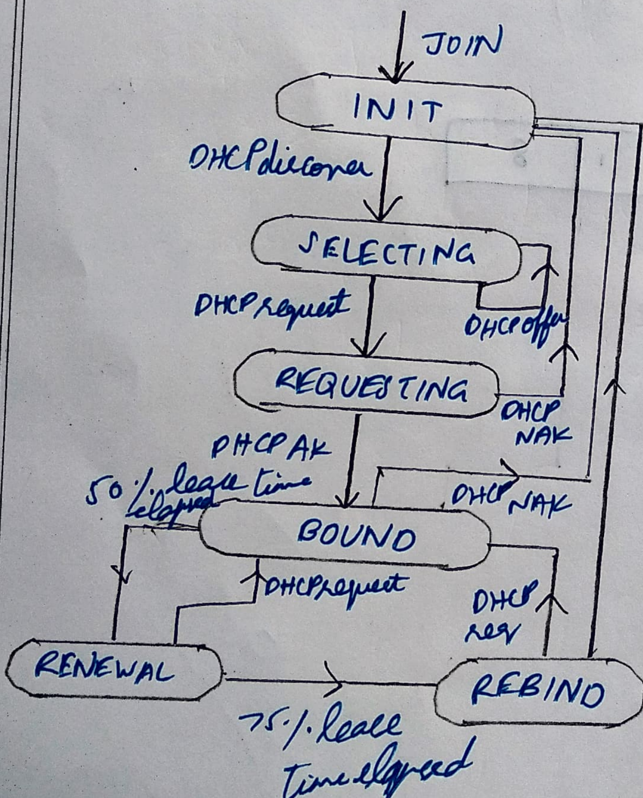
53	1	8

Tag

DHCP Discover
DHCP Offer
DHCP request
DHCP decline
DHCP ACK
DHCP NACK



State Machine:



Initially after joining, the sender / host discovers the client. The client sends a block of addresses.

The host SELECTS from the offer using DHCPoffer and selects one and REQUESTS ~~for~~ the client for assigning the address.

The client accepts / rejects using DHCPAK / DHCKNAK signals.

If it acknowledges, the host gets the address which is valid for 3600 minutes. After 50% lease time passes, it REQUESTS the client again. If it is rejected, it goes back to initial state, else after 75% lease time passes, it REQUESTS again. If the client ACCEPTS, it gets another address.

If the client DECLINES, it goes back to initial state (INIT).

bit 0 is represented as -1, bit 1 as 1 and silence is denoted by 0.

12: station 1 :

bit 0 : -1

station 2 :

bit 0 : -1

station 3 : silent

$\therefore$ 0

station 4 :

bit 1 : 1

chip sequences for stations are determined by using the Walsh table but no. of stations needs to be of the power of 2.

$W_k = [+1]$

$W_{k+1} = \begin{bmatrix} W_k & W_k \\ W_k & \overline{W_k} \end{bmatrix}$ → negate

Eg: 1 : $[+1]$

2 : $\begin{bmatrix} +1 & +1 \\ +1 & -1 \end{bmatrix}$

$\Rightarrow$ station 1 : $[+1 \quad +1]$

station 2 : $[+ \quad -1]$

4 : $\begin{bmatrix} +1 & +1 & +1 & +1 \\ +1 & -1 & +1 & -1 \\ +1 & +1 & -1 & -1 \\ +1 & -1 & -1 & +1 \end{bmatrix}$

$\therefore$ station 1 : $[+1 \quad +1 \quad +1 \quad +1]$

station 2 : $[+1 \quad -1 \quad +1 \quad -1]$

station 3 : $[+1 \quad +1 \quad -1 \quad -1]$

station 4 : $[+1 \quad -1 \quad -1 \quad +1]$

CDMA ~~sts~~

The ~~chit~~ sequence of each channel is multiplied with the respective bit representation. They are added and sent to the common channel.

A station retrieves another station's bit by multiplying that stations chip sequence with the sequence sent to the common channel and dividing the result by 4.

station 1:

$[+1 \quad +1 \quad +1 \quad +1] \cdot -1$

$\Rightarrow [-1 \quad -1 \quad -1 \quad -1]$

station 2:

$[+1 \quad -1 \quad +1 \quad -1] \cdot -1$

$\Rightarrow [-1 \quad +1 \quad -1 \quad +1]$

station 3:

$[+1 \quad +1 \quad -1 \quad -1] \cdot 0$

$\Rightarrow [0 \quad 0 \quad 0 \quad 0]$

station 4:

$[+1 \quad -1 \quad -1 \quad +1] \cdot 1$

$\Rightarrow [+ \quad -1 \quad -1 \quad +1]$

Total :

$$
\begin{array}{l}
[-1 \quad -1 \quad -1 \quad -1] \\
[-1 \quad +1 \quad -1 \quad +1] \\
[0 \quad 0 \quad 0 \quad 0] \\
[+1 \quad -1 \quad -1 \quad +1] \\
\hline
[-1 \quad -1 \quad -3 \quad +1]
\end{array}
$$

$\rightarrow$ sent to common channel.

Retrieving ~~st~~ S1 data :

$[-1 \quad -1 \quad -3 \quad +1][+1 \quad +1 \quad +1 \quad +1]$

$= [-1 \quad -1 \quad -3 \quad +1$

$= -4$

$-4/4 = -1 \rightarrow \therefore 0$ bit

Retrieving station 2 :

$[-1 \quad -1 \quad -3 \quad +1][+1 \quad -1 \quad +1 \quad -1]$

$-1 \quad +1 \quad -3 \quad -1 = -4$

$-4/4 = -1 \rightarrow \therefore 0$ bit.

Retrieving S3 data :

$[-1 \ -1 \ -3 \ +1] \cdot [+1 \ +1 \ -1 \ -1]$

$= -1 \ -1 + 3 \ -1$

$= 0$

$0/4 = 0$

$\therefore$ silence.

Properties of chip sequence :

The sum of chip sequences of all stations is 0.
Multiplying one chip sequence with another gives 0 while multiplying one chip sequence with itself gives 4 (in case of 4 stations).

eg: $(d_1 c_1 + d_2 c_2 + d_3 c_3 + d_4 . c_4) . c_1$

$\Rightarrow d_1 c_1 c_1 + d_2 c_2 c_1 + d_3 c_3 c_1 + d_4 c_4 c_1$

$\Rightarrow d_1 N$ (here $N = 4$) ,,

PART - B

~~7.~~

8.

65.24.74.0/24 [All subblocks should have addresses of ~~power~~ powers of 2 and $N = 2^{32-n}$ must be satisfied]

Given $n = 24$.

i) subblock of 10 addresses. 128

largest block first

nearest value is 16.

$\therefore N = 16$

$\Rightarrow 16 = 2^{32-n}$

$\therefore n = 32 - \log_2 16$

$= 32 - 4$

$= 28$.

subblock:

F.A		L.A
65.24.74.0/28	→	65.24.74.15/28
[00000000]		[0000 1111]

0000 1111

65.24.74.15

ii) subblock of 60 addresses.

nearest : 64.

$\Rightarrow N = 64$

$\therefore 2^{32-n} = 64$

$n = \cancel{64}\ 32 - \log_2 64$

$= 32 - 6$

$= 26$

$\therefore$ sub block:

F.A		L.A
65.24.72.16/26	→	65.24.72.79/26

16
64
80

16
5
21

0001 0000
1 1 1 1 1 1
32+31
= 63

16
0001 1111
31

iii) 120 addresses

nearest : 128

$\therefore N = 128$

$2^{32-n} = 128$

$n = 32 - \log_2 128 = 32 - 7 = 25.$

$\therefore n = 25$

$\therefore$ 65 . 24 . 74 . 80/25 F.A $\longrightarrow$ 65 . 24 . 208/25 L.A

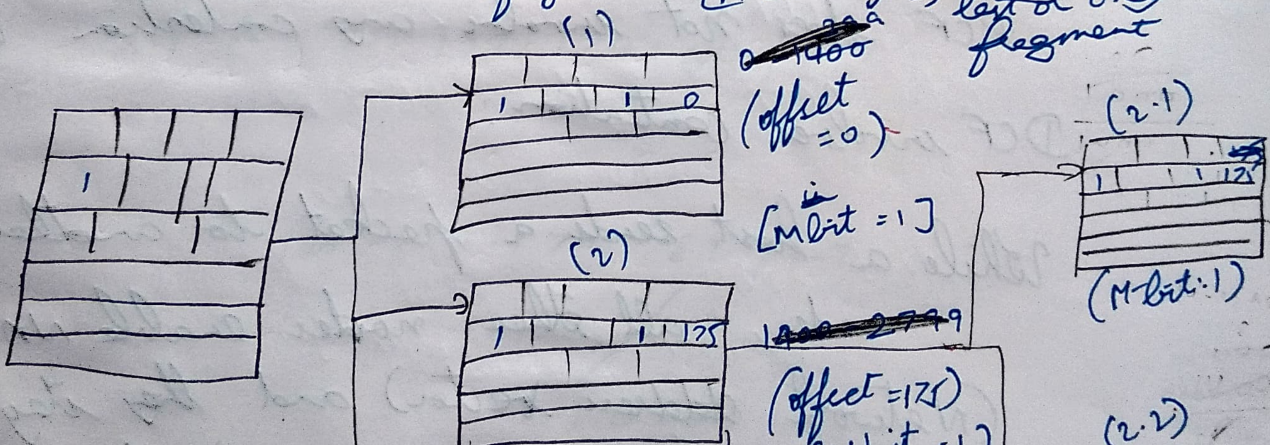
7. size = 5000 bytes.

Given : MTU = 1400

5000 / 1400 = 4 fragments

[M-bit : 1] $\Rightarrow$ not last fragment

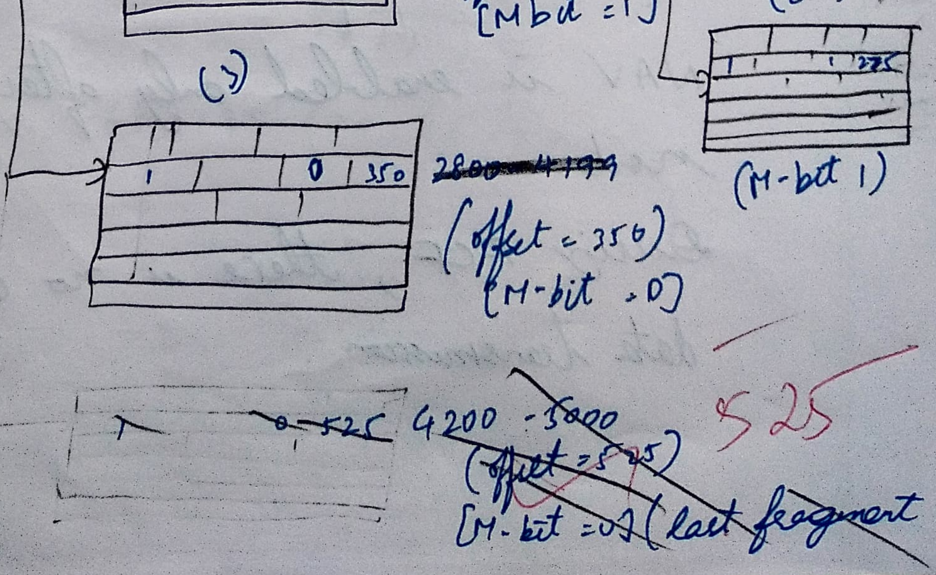
[M bit : 0] $\rightarrow$ last or only fragment



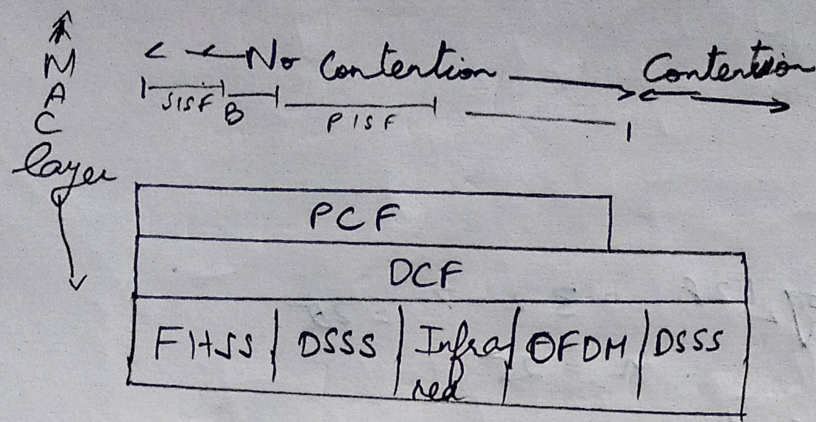
Offsets : 0, 175, (175, 275), 350

All fragments have same IDs

final fragment has M-bit as 0.



9. MAC sublayer 802.11



The MAC sublayer has 2 functions:

Distributed coordiated function

and

Point coordinate function.

PCF resides on top of DCF

PCF does not involve any contention while DCF involves contention.

While a host sends a packet to another node, all other nodes enable NAV (Network Address vector) and they stay idle.

NAV is enabled only after ACK signal from receiver node.

During PCF, there is no contention for the data transmission.

PART – A

1. 165 · 199 · 170 · 82 / 27

$N = 2^{32-n}$; $n = 27$

$\therefore N = 2^{32-27} = 2^5 = 32$ addresses

first address : 165 · 199 · 170 · 82 / 27

1 0 1 0 0 1 0

$\underbrace{1 0 0 1 0}_{0 0 0 0 0}$

$\therefore$ F · A = 165 · 199 · 170 · 64 / 27

L · A :

165 · 199 · 170 · 82 / 27

1 0 1 0 0 1 0

$\underbrace{1 0 0 1 0}_{1 1 1 1 1}$

$\therefore$ L · A = 165 · 199 · 170 · 95 / 27

2	82	
2	41	0
2	20	1
2	10	0
2	5	0
2	2	1
	1	0

64 16 2

1010010

1
2
4
8
16
64
95

2. special addresses:

0.0.0.0/27

When the host doesn't know its own address.

~~FF FF~~

255.255.255.255/27

Broadcast signal when receiver/client is not known.

3. offset = 120

HLEN = 5

Total length = 100

length of HLEN = 5 × 4 = 20

Total DATA = length − HLEN

= 100 − 20 = 80

offset = 120

∴ no. on ~~start~~ first ~~address~~ byte } = 120 × 8
= 960

L.B = 960 + 80 − 1

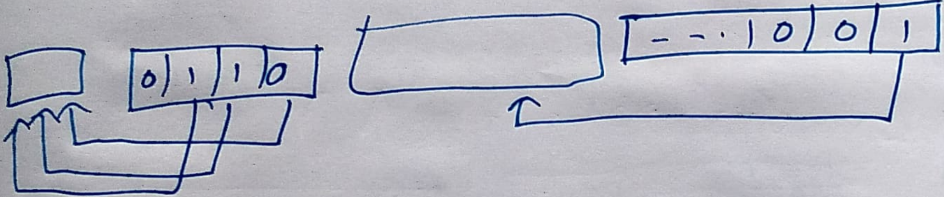
= 1039 //

4. Dividing Ethernet LAN into bridges reduces network traffic and enables fast data transmission.

Eg: Introducing a bridge in a network of 16 nodes will divide LAN into 2 segments thereby doubling the speed and reducing traffic.

5. Reservation access method uses bits to get access.

Bit 1 represents access.



6. Fast ethernet:

speed : 100 MBps

100BTX , 100BF , 100B2 , 100B5

100BTX – Twisted pair cables

100BF – Fibre Optic

100B2, 100B5 – Coaxial cables

Twisted pair cables, Fibre Optic – Full Duplex.

Business firms and companies ~~who~~ that would need ~~more~~ more than what is offered by standard Ethernet.

SL.NO:CAA179172

SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING

(An Autonomous Institution, Affiliated to Anna University, Chennai)
Rajiv Gandhi Salai (OMR), Kalavakkam – 603 110

THEORY EXAMINATIONS

Register Number	205001081		
Name of the Student	Rahul Rajagopalan		
Degree and Branch	B.E CSE	Semester	V - 'B'
Subject code and Name	UCS1501 Computer Networks		
Assessment Test No.	2	Date	14.10.22

Details of Marks Obtained

Part A

Question No.	Marks
1	2
2	1
3	2
4	1
5	1
6	2
Total (A)	9

Part B

Question No.	(a) Marks	(b) Marks	Total Marks
7	5		
8	3		
9	3		
Total (B)			11

Part C

Question No.	(a) Marks	(b) Marks	Total Marks
10			
11	8		
12	10		
13			
Total (C)			18

Grand Total (A+B+C)			38	Marks (in words)			
Signature of Faculty							

ssn

2

SL.NO:CAA179142

SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING

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Rajiv Gandhi Salai (OMR), Kalavakkam – 603 110

THEORY EXAMINATIONS

Register Number	205001085		
Name of the Student	Y. Sabarivasan		
Degree and Branch	BE CSE	Semester	V
Subject code and Name	UCS1501 Computer Networks.		
Assessment Test No.	II	Date	14/10/22.

Details of Marks Obtained

Part A

Question No.	Marks
1	2
2	2
3	0
4	1
5	0
6	0
Total (A)	5

Part B

Question No.	(a) Marks	(b) Marks	Total Marks
7	—		
8	3		
9	4		
Total (B)			7

Part C

Question No.	(a) Marks	(b) Marks	Total Marks
10	7		
11			
12			
13	10		
Total (C)			17

Grand Total (A+B+C)	29	Marks (in words)	
Signature of Faculty			

ssn

PART-C

(13) Data = 1101101

$\Rightarrow$ Condition: $2^r \geq m+r+1$.

$m = 7$.

$\Rightarrow 2^r \geq 8 + r$

$\Rightarrow 2^4 \geq 8 + 4 \quad (\therefore r = 4)$

$\therefore$ There are 4 parity bits needed.

Hamming code:

d_{11}	d_{10}	d_9	r_8	d_7	d_6	d_5	r_4	d_3	r_2	r_1
1	1	0		1	1	0		1		

$\Rightarrow r_1 = d_3\, d_5\, d_7\, d_9\, d_{11}$

$= 1\ 0\ 1\ 0\ 1$

$\boxed{r_1 = 1}$

$\Rightarrow r_2 = d_3\, d_6\, d_7\, d_{10}\, d_{11}$

$= 1\ 1\ 1\ 1\ 1$

$\boxed{r_2 = 1}$

$\Rightarrow r_4 = d_5\, d_6\, d_7$

$= 0\ 1\ 1$

$\boxed{r_4 = 0}$

$r_8 = d_9\, d_{10}\, d_{11}$

$= 0\ 1\ 1$

$\boxed{r_8 = 0}$

⇒ Hamming code:

1	1	0	0	1	1	0	0	1	1	1
			r_8				r_4		r_2	r_1

⇒ Introduce error at 6^{th} bit from LSB

Hamming code with error:

d_{11}	d_{10}	d_9	d_8	d_7	d_6	d_5		d_3		
1	1	0	0	1	0	0	0	1	1	1
			r_8		⇑		r_4		r_2	r_1

⇒ r_1 ⇒ $d_3\, d_5\, d_7\, d_9\, d_{11}$
$1 \quad 1\ 0\ 1\ 0\ 1$ ⇒ $r_1 = 0$ //

⇒ r_2 ⇒ $d_3\, d_6\, d_7\, d_{10}\, d_{11}$
$1 \quad 1\ 0\ 1\ 1\ 1$ ⇒ $r_2 = 1$ //

⇒ r_4 ⇒ $d_5\, d_6\, d_7$
$0 \quad 0\ 0\ 1$ ⇒ $r_3 = 1$ //

$r_8 = d_9 \; d_{10} \; d_{11}$

$\left.\begin{array}{cccc} 0 & 0 & 1 & 1 \end{array}\right\} \quad r_8 = 0$ //

<u>Finding error position.</u>

$(r_8 \, r_4 \, r_2 \, r_1) = (0110)_2$

$= (6)_{10}$

∴ Error in 6^{th} bit and hence flip the value at the 6^{th} bit.

⇒ <u>Corrected hamming code:</u>

d_{11}	d_{10}	d_9		d_7	d_6	d_5		d_3		
1	1	0	0	1	1	0	0	1	1	1
			r_8		⇑		r_4		r_2	r_1

<u>Algorithm:</u>

⇒ First the parity bits are analyzed.

⇒ The parity bits are checked if they have the correct value or not based on even parity.

⇒ In case, if there is a contradiction to the parity bit, then the parity bit is made to 1. If there is no contradiction to its value, then it is set to zero.

⇒ Finally all the parity bits are arranged from right to left which is in binary format.

⇒ Convert the binary format to decimal format to detect the error position.

⇒ Flip the value which is present in the error position of the hamming code.

(10) IP header format:

0 4 8 16 31

VER (4bits)	HLEN (4 bits)	Service type (8 bits)	Total length (16 bits.)	
Identification (16 bits)			Flag (3 bits)	Fragmentation offset (13 bits)
Time_to_live (8 bits)		Protocol (8 bits)	Header checksum (16 bits)	
Soure IP address (32 bits)				
Destination IP address (32 bits)				
Options + Padding (0 - 40 bits)				

~~⇒ VER ⇒~~

⇒ VER: it shows the version of the protocol.

⇒ HLEN: it is for header length.

⇒ Service type: it describes the type of service implemented

⇒ Total length: total length of the address.

⇒ Identefication: identefication of the host.

⇒ Flag: setting flag value of error occurs.

⇒ Fragmentation offset: denotes the offset value of the fragment.

⇒ Time-to-live: time required for the address to be used.

⇒ Protocal: denotes the protocal used.

⇒ Source IP address: holds the IP address of source.

⇒ Destination IP address: holds the IP address of destination.

⇒ Header checksum: denotes the checksum value of the header.

Debugging tools of ICMP

1) Error messages
2) Query messages.

(1) Error messages:

This helps in detecting the error occurred while transmitting data or error occured in host or in router.

Type (8 bits)	Code (8 bits)	Checksum (16 bits)
Rest Header.		
Data.		

The codes used for error messages are:

- 03 : Destination error
- 04 : Source error
- 15 : Redirection
- 11 : Time-to-live
- 12 : Parameter error.

(2) Query messages:

This tool helps to request for a specific data over from host or from destination.

Type (8bits)	Code (8bits)	Check sum (16 bits)
Identification		segment number
Data.		

Codes for query messages:

⇒ 08 : Echo request.

⇒ 13 : Source data request

⇒ 14 : Destination related request.

8

Beginning address } : 65.24.74.0/24

→ Total no. of addresses :

$n = 2^{32-24} = 2^8 = 256$ //

∴ Totally 256 addresses.

(i) Subblock of 120 addresses :

$N = 32 - \log_2(128) = 32 - 7$

$\boxed{N = 25}$

First address : 65.24.74.0/25.

Last address : 65.24.74.~~128~~ 119 /25.

(2)

(ii) Subblock of 60 addresses:

$N = 32 - \log_2(64) = 32 - 6$

$\boxed{N = 26}$

First address: 65.24.74.120/26

Last address: 65.24.74.179/26

(iii) Subblock of 10 addresses:

$N = 32 - \log_2(16) = 32 - \cancel{28}4$

$\boxed{N = 28}$

First address: 65.24.74.180/28

Last address: 65.24.74.189/28

∴ Out of 256 addresses, there are remaining 66 addresses which are still reserved.