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Assignment

CHAPTER 19 NETWORK LAYER: LOGICAL Addressing.

Ans 1 IPv4 :- 32 bits
IPv6 :- 128 bits

Ans 2 Dotted Decimal Notation They are written in decimal form with a decimal point separating the bytes. Address is 4 bytes (IPv4)

Hexadecimal notation They are written in hexadecimal form with a colon separating the bytes. Each address is 16 bytes or 32 hexadecimal digits. (IPv6)

Ans 3 Classful addressing It assigns an organization a class A, B or C block of address

Classless addressing It assigns an organization a block of contiguous addresses based on it needs

Ans 4
Unicast	Class A, B, C
Multicast	Class D
Reserved	Class E

Ans 5 A block in class A address is too large for almost any organization. A block in class C is probably too small for many organizations.

Ans 6 A mask is classful addressing is used to find the first address. The mask can be used with any address in the block to find the network address

Ans 7 A network address is a block of addresses in the first address

Ans 8 Subnetting A large address block could be split into several contiguous group

Supernetting A several small address block can be combined to create a large range of address

A subnet mask has more consecutive 1s
A supernet mask has fewer consecutive 1s

Ans 9 Multicast addresses in IPv4 start with 1110
Multicast addresses in IPv6 start with 11111111

Ans 10 A quick solution to shortage of addresses is called NAT. NAT enables a user to have a large set of addresses internally and one address or a small set of addresses.

Ans 11 (a) $2^8 = 256$
(b) $2^{16} = 65536$
(c) $2^{64} = 1.8447 \times 10^{19}$

Ans 12 $2^n = 1024$
$n = \log_2 1024$
$n = 10$

Ans 13 $2^{16} - 5 = 65,531$

Ans 14
a)	01110010	00100010	00000010	00001000
b)	10000001	00001110	00000110	00000100
c)	11010000	00100010	00010110	00001100
d)	11011110	00100010	00000010	00000000

Ans 15 (a) 127.240.103.125 (c) 223.176.31.93
(b) 145.192.240.29 (d) 238.247.199.23

Ans 16 (a) Class C (c) Class A
(b) Class D (d) Class B

Ans 17 (a) Class E (c) Class C
(b) Class B (d) Class D

Ans 18
	Host ID	NET ID
(a)	342.8	114
(b)	8.6	132.56
(c)	12	208.3454

Ans 19
Host address	25	34	12	56
Mask	255	255	0	0
Network address	25	34	0	0
Host "	25	34	12	56
Mask complement	0	0	255	255
Last address	25	34	255	255

Ans 20
Host address	182	44	82	16
Mask	255	255	255	192
Network address	182	44	82	0
Host address	182	44	82	16
Mask complement	0	0	0	63
Last address	184	44	82	63

Ans 21 (a) $\log_2 500 = 8.95$ 18
Extra 1s = 9 Mask: 117 (8+9)
Possible Subnets: 512

	Host ID			Net ID
(b)	$2^{32-17} = 2^{15} = 32768$			
(c)	First (1)	16	0	0 0
		0	0	127 255
	last (2)	16	0	127 255
(d)	first (500)	16	248	128 0
		0	0	127 255
	Last	16	249	255 255

Ans 22 (a) $\log_2 1024 = 10$
Extra 1s = 10 Mask: 120
Possible subnets = 1024
(b) $2^{36-30} = 64$
(c) First (1) 120 56 0 0
0 0 63
Last (1) 120 56 0 63
(d) first

(a) First (1024) 120 56 255 & 192
0 0 0 63
Last (1087) 120 56 255 255

Mask : /29 (24+5)

Ans 23 (a) $\log_2 32 = 5$
Extra bits = 5
Possible subnets = 32

(b) $2^{32-29} = 8$

(c) First (1) 211 17 180 0
0 0 0 7
Last (1) 211 17 180 7
(d) First (32) 211 217 180 248
0 0 0 7
Last (32) 211 17 180 255

Ans 24 (a) /124 (b) /18 (c) /19 (d) /20

Ans 25 (a) Number of address $= 2^{32-29} = 8$
From 123 56 77 32
0 0 0 7
To 123 56 77 39

(b) Number of address $= 2^{32-27} = 32$
From 200 17 21 128
0 0 0 81
To 200 17 21 159

(c) Number of address $= 2^{32-27} = 512$
From 17 34 16 0
0 0 1 255
to 17 34 17 255

(d) Number of address $= 2^{32-30} = 4$
From 180 34 64 64
0 0 0 3

Ans 27 Sub Blocks

1st 120.60.40/29 to 120.60.47/29
2nd 120.60.48/29 to 120.60.55/29
.
.
100th 120.60.7.24/29 to 120.60.7.31/29

1024 − 800 = 224 address left
from 120.60.7.32 to 120.60.7.255

Ans 28 Not a network

Ans 29 (a) 2340:1ABC:119A:A000:0 (b) 0:AA:119A:3221
(c) 2340:1AA:A000:0 (d) 0:80:2340:0

Ans 30 (a) 0000:0000:0000:0000:0000:0000:0000:0000
(b) 0000:00AA:0000:0000:0000:0000:0000:0000
(c) 0000:1234:0000:0000:0000:0000:0000:0003
(d) 0123:0000:0000:0000:0000:0000:0000:0008

Ans 31 (a) Link Loader address (b) Site local address
(c) Multicast address (d) Loopback address

Ans 32 (a) Unspecified address of
(b) Mapped ,,
(c) Provider based ,, : INTERNIC
(d) ,, ,, ,, : RIPNIC
(e) ,, ,, ,, : APNIC

Ans 33 58ABCI

Ans 34 (a) 0:: 8106:122
(b) 0:AAAA:8106:122

Ans 35 (a) FE80 :: 123
(b) FECO :: 123

Ans 36 FF02 < group ID>

Ans 37 Node Identifier :: 0000:0000:1211
Subnet address :: 58IE:1456:2314:ABCD:0000
subnet identity

Ans 38 From: 58IE:1456:2314:0000:ABCD:0000:0000:xxxx
To 58IE:1456:2314:000A:ABCD:0000:00C8:xxxx
node Identifier

Ans 39

CHAPTER 20

Network Layer : Internet Protocol

Ans 1 (i) The delivery of a frame in the data link layer is node to node
(ii) The delivery of packet of the network layer is host to host

Ans 2 (i) In a connectionless service, there is no setup or teardown phase
(ii) Communication has only one phase : data transfer
(iii) Communication has 3 phases :-
(a) Setup
(b) data transfer
(c) Teardown

Ans 3 (i) Each data link layer protocol has a limit on the size of the packet it can carry
(ii) Datagram must be fragmented
(iii) IPv4 allow fragmentation at the host and by router
(iv) IPv6 allows fragmentation only at the host

Ans 4 (i) The value of checksum field is set to 0
(ii) The entire header is divided into 16-bit sections
(iii) The checksum in the IPv4 packet covers only the header, not the data

Ans 5 (i) Options can used for network testing and debugging i.e. (a) pre-operation
(b) end of option

(c) record route
(d) strict source route
(e) loose source route
(f) timestamp

Ans 6

IPv4 fields	IPv6 fields
Version	Version
Header length	priority
Service type	Payload length
total length	
Identification	
Flags	
Fragment offset	
Time to live	Hop limit
Protocol	Next header
checksum	
Source address	Source address
Destination address	Destination address
	Flow label

Ans 7 (i) In IPv4 priority is handled by a field called service type
(ii) In former interpretation the three leftmost bits of the field define the priority or precedence. In the latter interpretation the four leftmost bits of the field define the priority

Ans 8 Options in IPv4 — Options in IPv6

→ No operation and end of option → Hop by Hop Padding

→ → Hop by Hop - jumbo payload

→ Record route

→ Strict and loose source route → Source route

→ Timestamp

→ Fragmentation
→ Authentication
→ Encrypted security payload
→ Destination

Ans 9 The checksum is eliminated in IPv6 because it is provided by upper layer protocol it is therfore not needed at this level

Ans 10 • The three transition strategies are :-
Dual Stack
tunneling
header translation
• Tunneling the IPv6 packets with the help of IPv4 routers
• Tunneling is the strategy used when two computers using IPv6 want to communicate with each other and the packet

Ans 11 (i) No fragment occurs at the router
(ii) The fields to change in base header are time to live field
(iii) The multiple byte options are present, then there will be changes in the options headers as well
(iv) If fragmentation occurs, the total length field will change to reflect the total length of each data gram
(v) The more fragment bit of the flags field and the fragmentation offset field may also change to reflect the fragmentation
(vi) If options are present and fragmentation occurs, the header length field of the header may also change to reflect whether or not the option was included in the fragment.

Ans 12 Header length = total length − data length
= 1200 − 1176
= 24
HLEN = 24/4
= 6 in decimal or 0110 (in binary)

Ans 13 Advantage (Large MTU)
(i) Few lost datagrams
(ii) More efficient due to less overhead
(iii) Fast delivery
(iv) No reassembly
(v) No fragmentation
(vi) Good for transferring large amounts of data long distances.

Advantages (Small MTU)
1) Better for for suited multiplexing
2) Good for transferring time - sensitive data such as audio or video

Ans 14 The first byte number can be calculate from the offset itself. If the offset is 120 that means that 120 × 8 or 960 bytes were sent before this fragment
First byte number = 960

Ans 15 The value of the header length field of an IP packet can never be less than 5 because every IP datagram must have atleast a base header that has a fixed size of 20 bytes. The value of HLEN field

Ans 16 HLEN field = 7 ∴ (7 × 4 = 28)
Base header = 20
Total number of option bytes = 8

Ans 17 Size of option field = 20 bytes
Total lenght of header = 40 bytes
HLEN field will be total number of bytes in header divided by 4 in this case the (10 in binary)

Ans 18 = 36 bytes − HLEN field × 4
= 36 − 20
= 16 bytes

Ans19 Header length is 20 bytes. If HLEN field is 5 or 1010 (binary)
Total length is 1024 + 20 or 1044 bytes

Ans20 The identification field is incremented for each new fragmented datagram. If first is 1024, then the last is 1024 + 99 = 1123

Ans21 The M bit is zero, this means that the datagram is either the last fragment or it is not fragmented at all since its offset is 0, it cannot be the last fragment of fragmented data gram. The datagram is not fragmented.

Ans22 The offset field store the offset from the begining of original datagram in multiple of 8 bytes, an offset of 100 indicates that there were 800 bytes of data sent before this data in this fragment

Ans23 ver = 0x4 = 4
Hlen = 0x5 = 5
= 5 * 4 = 20
service = 0x00 = 0
total length = 0x0054 = 84
Identification = 0x0003 = 3
Flags and Fragmentation = D = 0
M = 0
Offset = 0
Time to live = 0x20 = 32
Protocol = 1

Source address = 0x7C450302 = 124.69.3.2
Destination address = 0x040E0A02 = 4.14.10.2

(a) The packet is not compressed
(b) There are no options
(c) The packet is not fragmented
(d) Data size is 64 bytes (84 - 20)
(e) The packet may visit upto 32 more routers
(f) The identification number of the packet is 3
(g) The type of service is normal

Ans24 Data size = 200 - (5 * 4) = 180 bytes
Offset = 200 * 8 = 1600
No number of first byte = offset value = 1600
last " = offset value + data size = 1779

Although
M = 0
Offset ≠ 0
Then it is last fragment