IP ADDRESSING

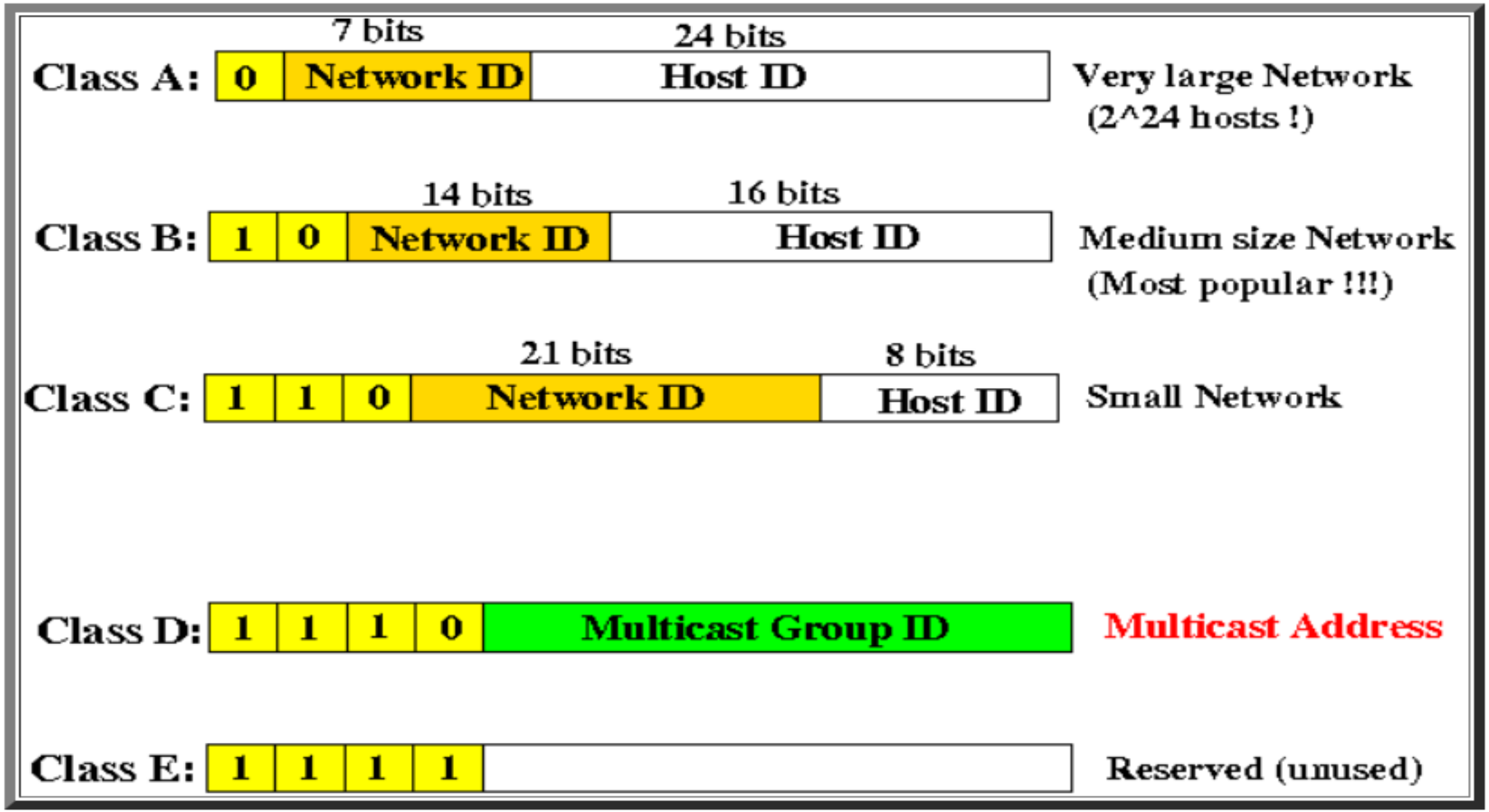
Class A : 0	→	(1 - 126),	No. of IP Addresses = 2^{31}
Class B : 10	→	(128 - 191),	No. of IP Addresses = 2^{30}
Class C : 110	→	(192 - 223),	No. of IP Addresses = 2^{29}
Class D : 1110	→	(224 - 239),	No. of IP Addresses = 2^{28}
Class E : 1111	→	(240 - 255),	No. of IP Addresses = 2^{28}

Note:

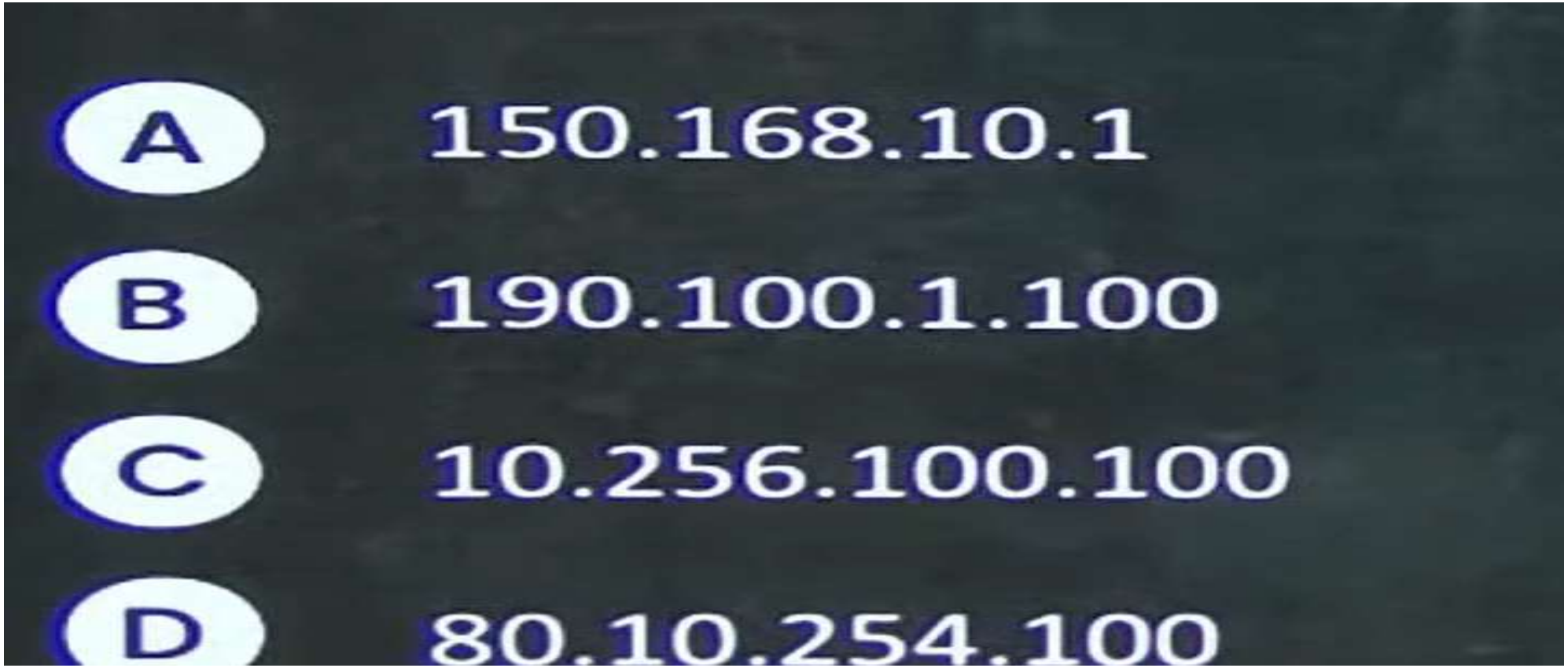
The IP address 127.x.y.z is known as loop back address and it is used to check the connectivity.

Complete Details of Classes, Number of Networks & Number of hosts per Network

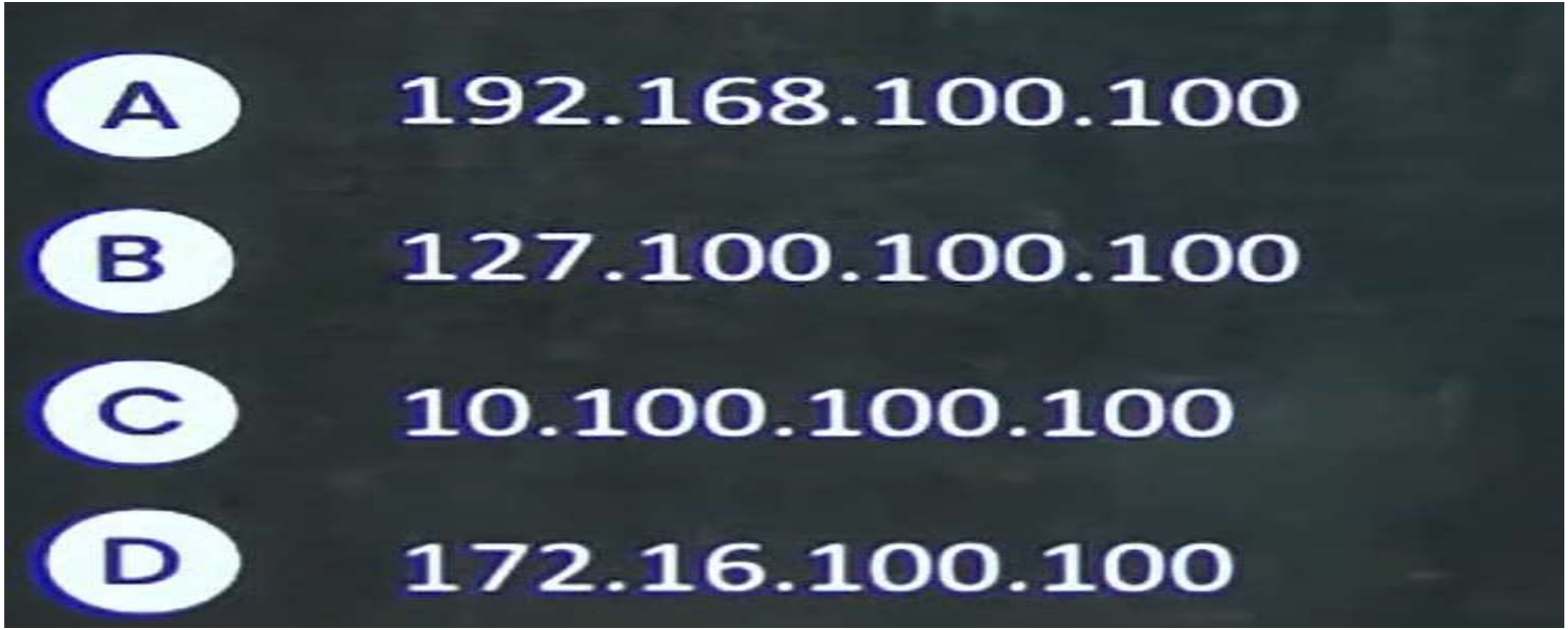
Class	Number of Networks	Number of hosts per Network
Class A	$2^{7} - 2 = 126$	$2^{24} - 2 = 1,67,77,214$ hosts
Class B	$2^{14} = 16,384$	$2^{16} - 2 = 65,534$ hosts
Class C	$2^{21} = 20,97,125$	$2^{8} - 2 = 254$ hosts
Class D	No NID and HID, all 28 remaining bits are used to define multicast address	
Class E	No NID and HID, it is meant for research and future purpose	


7 bits
24 bits
Class A:
0
Network ID
Host ID
Very large Network
(2^24 hosts !)
14 bits
16 bits
Class B:
1
0
Network ID
Host ID
Medium size Network
(Most popular !!!)
21 bits
8 bits
Class C:
1
1
0
Network ID
Host ID
Small Network
Class D:
1
1
1
0
Multicast Group ID
Multicast Address
Class E:
1
1
1
1
Reserved (unused)

INVALID IP ADDRESS



Which IP Address Used as Inter Process Communication



Q.4 The Dotted decimal notation (DDN) format for the given Hexadecimal notation (HDN) C22F1582 is

A 194.50.21.145

B 194.47.21.130

C 194.45.21.120

D 194.47.20.130

Types of Communications

(i) Unicast communication (1 : 1)

(ii) Broadcast communication (1 : All)

(iii) Multicast Communication (1: Many)

Unicast Communication

1. Transmitting the data from one computer to another computer is called as unicast communication.
2. It is one to one transmission.
3. In Unicast communication both source and destination either present in the same network or in the different network.

LIMITED BROADCASTING

1. Transmitting data from one computer to all other computer in the same network is called as Limited Broadcasting.
2. Limited Broadcast Address = **255.255.255.255**

3. LBA cannot be used as Source IP address. .
4. Limited broadcast Address will always be used as a Destination IP.

1. Transmitting data from one computer to all other computer in the different network is called as Limited Broadcasting.
2. DBA cannot be used as Source IP address.
3. Direct broadcast Address will always be used as a Destination IP.

Match the following:

	List-I		List-II
(a)	200.10.192.100	(i)	Class A
(b)	7.10.230.1	(ii)	Limited broadcast address
(c)	128.1.1.254	(iii)	Directed broadcast address
(d)	255.255.255.255	(iv)	Class C
(e)	100.255.255.255	(v)	Class B

Q.3 What is the network ID (NID) of the IP address 230.100.123.70 ? (Assuming Classfull addressing scheme is followed.)

A 230.100.123.0

B 230.100.0.0

C 230.0.0.0

D None of these

Which of the following can be used as a source IP as well as destination IP ?

A 23.0.0.97

B 255.255.255.255

C 157.54.255.255

D 15.255.255.255

Q.4 Find the subnet Address for the Following

IP Address: 200.34.22.156

Mask: 255.255.255.240

A 200.33.22.144

B 200.34.22.143

C 200.34.22.13

D 200.34.22.144

If subnet Mask = 255.255.255.224 then Find

(i) No. of IP Address/subnet possible _____

(ii) No. of Host/subnet possible _____

(iiii) No. of subnet in class A _____

(iv) No. of subnet in class B _____

(v) No of subnet in class C _____

EX-2 One of the address of the Block is 100.100.100.68/27 then find

i. No. of addresses in a Block
ii. Range of IP address
iii. Block id/ network id
iv. First host
v. Last hot
vi. DBA

3 An organization is granted the block 150.36.0.0/16. The Administrator want to create 512 subnets. What is the subnet mask.

a. 255.255.255.192/26

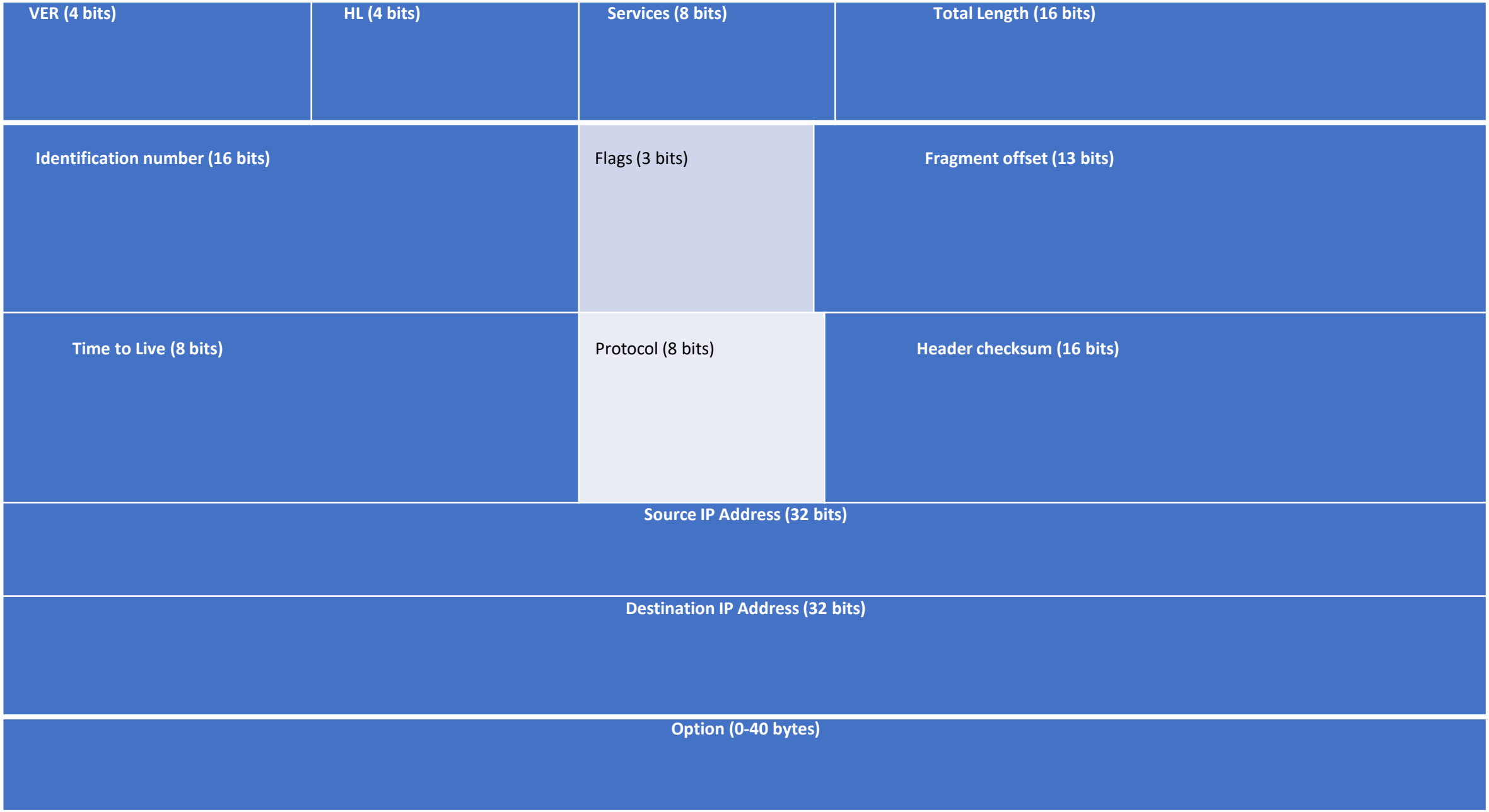
b. 255.255.255.224/27

c. 255.255.255.128/25

d. 255.255.255.240/28

IPv4 header

VER	HL	Services	Total Length
Identification No.		Flags	Fragment offset
Time to Live		Protocol	Header checksum
Source IP Address			
Destination IP Address			
Option			


VER (4 bits)
HL (4 bits)
Services (8 bits)
Total Length (16 bits)
Identification number (16 bits)
Flags (3 bits)
Fragment offset (13 bits)
Time to Live (8 bits)
Protocol (8 bits)
Header checksum (16 bits)
Source IP Address (32 bits)
Destination IP Address (32 bits)
Option (0-40 bytes)

Time to live (8 bits)

1. TTL is used to avoid infinite looping.
2. TTL field is used to control the maximum number of hops visited by datagram.
3. When a source host sends a datagram, it stores a number in this field. Each router that process the datagram decrements this number by one. If TTL field reaches zero before the datagram arrives at its destination, then the datagram is discarded and an ICMP message is sent back to sender.
4. TTL value is decremented at destination and router.

PROTOCOLS(8 bits)

1. This 8 bits field tell us which protocol is encapsulated in the IP packet.
2. At the time of traffic, some packet must be discarded. In this case it will be advantageous to know which protocol data it contains.
3. The order in which router eliminate the datagram from buffer is :
4. **ICMP(01) >IGMP(02) >UDP (17) >TCP(06)**

HEADER CHECKSUM-16bit

- It is calculated only for header part not the data because rest of the component in packet already covered by TCP checksum.
- Header checksum is calculated at each and every Router because IP Header might be change when packet is moving from one router to another.
- Every router makes one modification i.e. TTL so Header checksum is calculated at every Router.
- Fragment offset, MF, Total length, option all may be changed at a Router.

Options

The Header of IPv4 data gram is made of two parts a fixed part and a variable part. The fixed part is 20 bytes long and variable part that can be maximum of 40 bytes.

There are 5 options

1. Strict source Routing
2. Loose source Routing
3. Record Routing
4. Time stamp
5. Padding

Q.1 In an IPv4 packet the value of HLEN is $(1100)_2$. How many Byte of options are being carried by this packet ?

A. 40 Byte

B. 60 Byte

C. 12 Byte

D. 28 Byte

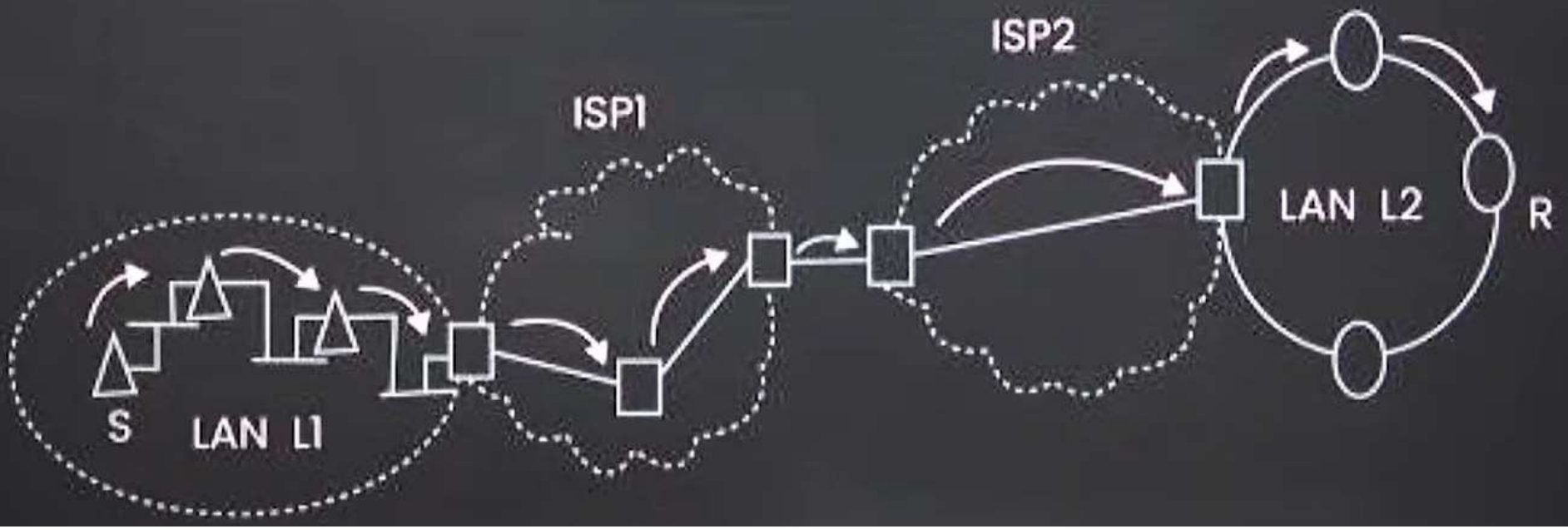
An IPv4 packet has arrived with the first few Hexadecimal digits as shown below $(45000005C00030000\ 59\ 06\ \ldots\ldots)_{16}$. How many Hops can this packet take before being dropped ?

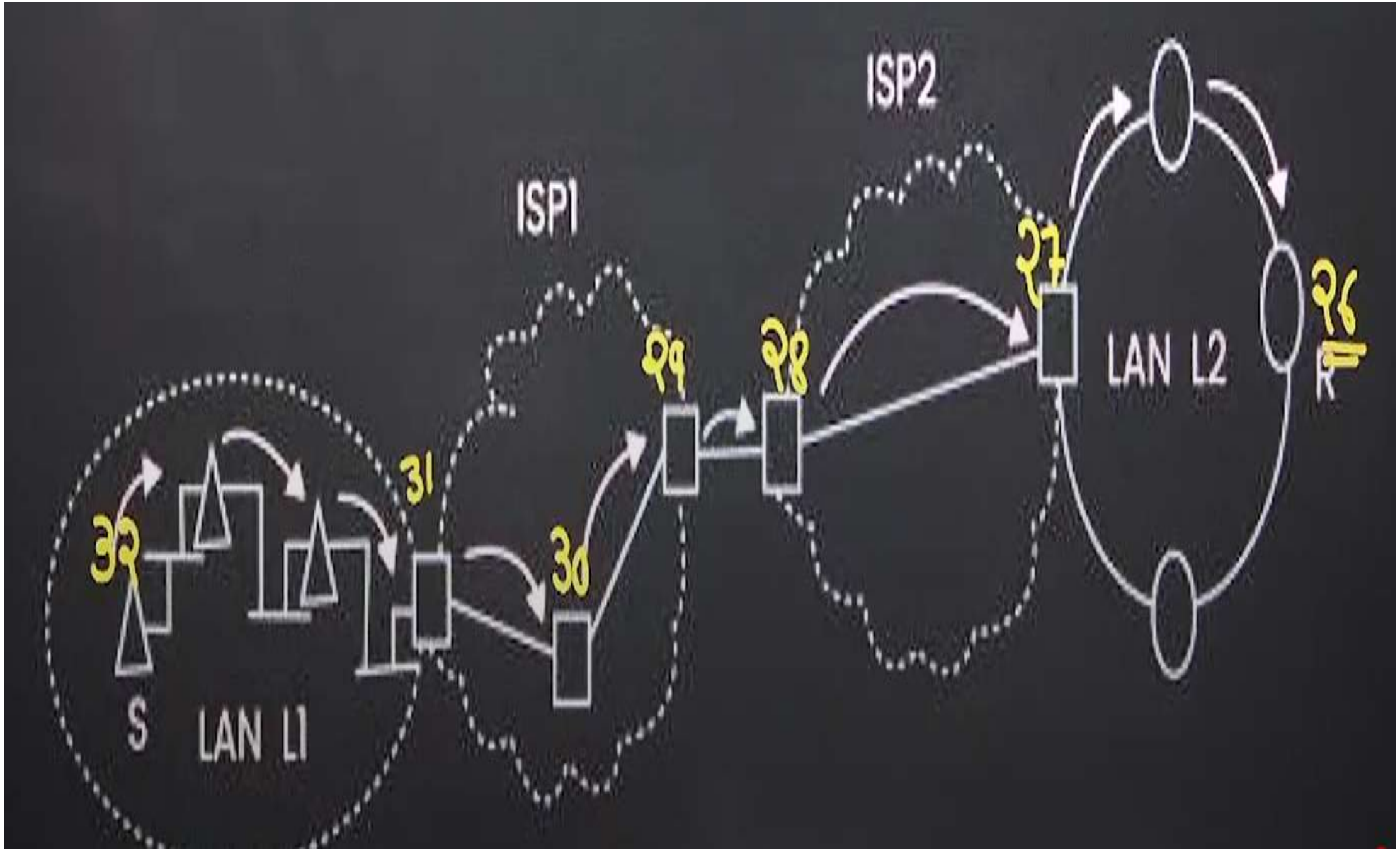
Q.5 An IPv4 packet has the first few Hexadecimal digit as shown below 450000 5C 000 3 0000 59 06

The above packet is belong to which protocol

Q.7 In the diagram shown below, L1 is an Ethernet LAN and L2 is a Token-Ring LAN. An IP packet originates from sender S and traverses to R, as shown. The links within each ISP and across the two ISPs, are all point-to point optical links. The initial value of TTL field is 32. The maximum possible value of the TTL field when R receives the datagram is _____.

GATE 2014




ISP2
ISP1
LAN L2
LAN L1
S
R

Q.1 An IP datagram of size 1000 bytes arrives at a router. The router has to forward this packet on a link whose MTU (maximum transmission unit) is 100 bytes. Assume that the size of the IP header is 20 bytes. The number of fragments that the IP datagram will be divided into for transmission is _____.

Q.3 An IP router with a Maximum Transmission Unit (MTU) of 1500 bytes has received an IP packet of size 4404 bytes with an IP header of length 20 bytes. The values of the relevant fields in the header of the third IP fragment generated by the router for this packet are (GATE2014)

A. MF bit: 0, Datagram Length: 1444; Offset: 370

B. MF bit: 1, Datagram Length: 1424; Offset: 185

C. MF bit: 1, Datagram Length: 1500; Offset: 370

D. MF bit: 0, Datagram Length: 1424; Offset: 2960

Distance vector Routing	Link state Routing
1. 1980's	1. 1990's
2. Bandwidth required is very less because we sent only distance vector packet.	2. Band width required is high because we sent entire link state packet
3. Local knowledge	3. Global knowledge
4. Bellman Ford algorithm	4. Dijkstra algorithm
5. Traffic is very less	5. Traffic is very high
6. Convergence is very low	6. Convergence is faster
7. Count to infinity Problem	7. No problem of count to infinity
8. Persistent Loops	8. Transient Loops
9. RIP	9. OSPF