COURSE NAME: Computer Networks

CHAPTER: Lab Lecture 1

SOLVED BY

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LAB Lecture - 1 : IP Addressing I
Conversion

* There will be 8 bits, or we have split the whole by 8 bits. (octate)

8	7	6	5	4	3	2	1
↓	↓	↓	↓	↓	↓	↓	↓
2^{8-1}	2^{7-1}	2^{6-1}	2^{5-1}	2^{4-1}	2^{3-1}	2^{2-1}	2^{1-1}
↓	↓	↓	↓	↓	↓	↓	↓
128	64	32	16	8	4	2	1
	128/2	64/2	32/2	16/2	8/2	4/2	2/2

Corresponding value →

Will help to remember →

Values according to the position of the bits							
8	7	6	5	4	3	2	1
↓	↓	↓	↓	↓	↓	↓	↓
128	64	32	16	8	4	2	1

Binary to Decimal Conversion :

1 Given that,
  10011001

1	0	0	1	1	0	0	1
↓			↓	↓			↓
128			16	8			1

$(128 + 16 + 8 + 1) = 153$

$\therefore 10011001 = 153$

2. Given that,

10101010

$$
\begin{array}{cccccccc}
1 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\
\downarrow & & \downarrow & & \downarrow & & \downarrow & \\
128 & & 32 & & 8 & & 2 &
\end{array}
$$

$(128 + 32 + 8 + 2) = 170$

∴ 10101010 = 170

Decimal to Binary Conversion :

1. Given that,

172

i) 172 is divisible by the value of 8th bit that is 128. So, the 8th bit would be 1. Now,

172 - 128 = 44

ii) 44 is not divisible by the value of 7th bit that is 64. So, the 7th bit would be 0.

iii) 44 is divisible by the value of 6th bit that is 32. So. the 6th bit would be 1. Now,

44 - 32 = 12

iv) 12 is not divisible by the value of 5th bit that is 16. So, the 5th bit would be 0.

	1
	10
	101
	1010

v) 12 is divisible by the value of 4th bit that is 8. So, the 4th bit would be 1. Now, 12-8 = 4

10101

vi) 4 is divisible by the value of 3rd bit that is 4. So, the 3rd bit would be 1. Now, 4-4 = 0

101011

vii) 0 is not divisible by the value of 2nd bit that is 2. So, the 2nd bit would be 0.

1010110

viii) 0 is not divisible by the value of 1st bit that is 1. So, the 1st bit would be 0.

10101100

$\therefore$ 172 = 10101100

2. Given that,

193

$$
\begin{array}{r}
193 \\
-128 \\
\hline 65 \\
-64 \\
\hline 1
\end{array}
$$

$\longrightarrow 8 \to 1$

$\longrightarrow 7 \to 1$

$\longrightarrow 6 \to 0$

$\longrightarrow 5 \to 0$

$\longrightarrow 4 \to 0$

$\longrightarrow 3 \to 0$

$\longrightarrow 2 \to 0$

$$
\begin{array}{r}
1 \\
-1 \\
\hline 0
\end{array}
$$

$\longrightarrow 1 \to 1$

$\therefore$ 193 = 1100000

Addressing Skim :

⇒ Every device must have address.

→ There are 3 ~~addres~~ types of address. These are :—

1. Physical Address
2. Logical Address } To identify a device

3. Port Address. } To identify a problem inside a device

1. Physical Address :

⇒ Physical Address is used to communicate inside a network.

⇒ It's also known as MAC Address (Medium Access Control)

⇒ MAC Address consists of 6 bytes / 48 bits.

⇒ MAC Address is represented in Hexadecimal number

⇒ LAN (Local Area Network) - এর NIC (Network Interface Card)-এ MAC Address দেওয়া থাকে।

  Example : CA1885 - 0CB72C or, CA - 18 - 85 - 0C - B7 - 2C

⇒ MAC Address অবশ্যই unique হয়। No two NICs share same MAC address.

⇒ Physical Address হলো lowest - level address.

* কোন PC-এর MAC Address জানার জন্য → cmd -তে গিয়ে `ipconfig /all` লিখে Enter দিতে হবে।

2. **Logical Address :**

⇒ It's known as IP IP Address (Internet Protocol)

⇒ It's consists of 32 - bits

⇒ No two publicly addressed and visible hosts on the Internet can have same IP address.

3. **Port Address :**

⇒ Port Address controls applications. (Such as - Email, FTP)

⇒ It's given by an organization named IANA (Internet Assigned Number Authority)

⇒ It's consists of 16 - bits.

⇒ Popular Port number → 80 ; application → HTTP (Hyper Text Transfer Protocol) ; protocol → TCP

IP Address Conversion :

⇒ IP address is unique and universal.

⇒ It has 32- bits that are divided into four octates which are separated by dot (.) . Example -

11000100. 00000010. 11000010. 11111111
   1st   2nd   3rd   4th
  octat   Oclet   Octet   Octet

Address Space : Total number of address used by a protocol.

For b bits, the address space is 2^b.

Example - Address space of IPv4 is 2^{32}. [4 byte → 4×8 = 32 bits]

IP Conversion → Convert every octet to decimal ::

1. Given that,

1 0 0 1 0 0 0 0 . 0 0 0 0 1 0 0 0 . 1 1 1 0 0 1 1 0 . 0 0 0 0 0 0 0 0

128   16   8   128 64 32   4 2

(128+16 = 144)   8   (128+64+32+4+2 = 230)

So, 144 . 8 . 230 . 0