LAB 2: IP Addresses and Host-to-Host Communication – answers for exercises 1 and 2

Contents

Exercise 1: Converting between the numeral systems

Task 1: Binary numbers to decimal

Convert the following binary numbers to decimal and write down the results in the table

Binary	Decimal
00001111	15
11110000	240
11111111	255
10101010	170
11111110	254

Task 2: Converting decimal numbers to binary

Now, let us do the opposite - convert the decimal numbers in binary and fill in the table the results

Decimal	Binary
192	11000000
168	10101000
5	00000101
240	11110000
256	100000000 (9 bits here!)

Task 3: Converting hexadecimal to binary numbers

Why do we need the hexadecimal numbering system? Well, one reason is that the MAC addresses are represented in this format. In this task, you are asked to convert some MAC addresses into binary numbers. Please fill in the table respectively.

Hexadecimal (MAC Address)	Binary

10-1F-74-E2-2D-12	00010000-00011111-01110100-11100010-00101101-00010010
B0-05-94-F4-A8-0D	10110000-00000101-10010100-11110100-10101000-00001101
70-18-8B-C6-86-DC	01110000-00011000-10001011-11000110-10000110-11011100
00-1F-3B-99-34-7D	00000000-00011111-00111011-10011001-00110100-01111101
E8-11-32-4E-07-DB	11101000-00010001-00110010-01001110-00000111-11011011

Who is the vendor of the network adapter that has the first in the table MAC address (10-1F-74-E2-2D-12)? How do you know it?
Answer: Hewlett Packard. By searching the OUI (10-1F-74) on the Internet.

Exercise 2: IP Addresses and Masks

Given some IP networks and subnet masks, determine:

- The network address
- The broadcast address
- The first usable host address
- The last usable host address

IP Network and Mask	Network Address	Broadcast Address	First host Address	Last Host Address
192.168.1.0/24	192.168.1.0	192.168.1.255	192.168.1.1	192.168.1.254
192.168.0.0/24	192.168.0.0	192.168.0.255	192.168.0.1	192.168.0.254
10.0.0.0/23	10.0.0.0	10.0.1.255	10.0.0.1	10.0.1.254
15.137.14.128/25	15.137.14.128	15.137.14.255	15.137.14.129	15.137.14.254
213.0.0.0/8	213.0.0.0	213.255.255.255	213.0.0.1	213.255.255.254