

Name: Pheng Menghour

ID: e20210737

### Network I

- I. Find Network Address, Broadcast Address and Range of usable IP address form below IP address:
1. 10.10.10.50/27
  2. 192.168.168.168/25
  3. 11.11.11.11/29
  4. 192.168.168.192/24
  5. 20.20.20.20/28
- II. Find Network address, Broadcast address and Range of IP address form below IP address with standard calculation (AND and OR Operation)
1. 172.17.17.17/21
  2. 10.10.10.10/16

### Answer

- I. Find Network Address, Broadcast Address and Range of usable IP address from below IP address:
1. 10.10.10.50/27
$$2^{32-27} = 2^5 = 32$$
    - Usable IP = 10.10.10.33 -> 10.10.10.62
    - Network Address = 10.10.10.32/27
    - Broadcast Address = 10.10.10.63/27
  2. 192.168.168.168/25
$$2^{32-25} = 2^7 = 128$$
    - Usable IP = 192.168.168.129 -> 192.168.168.254
    - Network Address = 192.168.168.128/25
    - Broadcast Address = 192.168.168.255/25
  3. 11.11.11.11/29
$$2^{32-29} = 2^3 = 8$$
    - Usable IP Address = 11.11.11.12 -> 11.11.11.17
    - Network Address = 11.11.11.11/29
    - Broadcast Address = 11.11.11.18/29

4. 192.168.168.192/24

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

- Usable IP Address = 192.168.168.1 -> 192.168.168.254
- Network Address = 192.168.168.0/24
- Broadcast Address = 192.168.168.255/24

5. 20.20.20.20/28

$$2^{32-28} = 2^4 = 16$$

- Usable IP Address = 20.20.20.17 -> 20.20.20.30
- Network Address = 20.20.20.16/28
- Broadcast Address = 20.20.20.31/28

II. Find Network address, Broadcast address and Range of IP address form below IP address with standard calculation (AND and OR Operation)

1. 172.17.17.17/21

$$\begin{aligned} 172.17.17.17 &= 1\ 0\ 1\ 0\ 1\ 1\ 0\ 0.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1 \\ /21 &= 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1.\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1.\ 1\ 1\ 1\ 1\ 1\ 0\ 0\ 0\ 0.\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \end{aligned}$$

Find Network Address by using AND Operation:

$$\begin{aligned} &1\ 0\ 1\ 0\ 1\ 1\ 0\ 0.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0.\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0 \\ &= 172.17.16.0 \end{aligned}$$

Find Broadcast Address by using OR Operation:

Network Address:

$$1\ 0\ 1\ 0\ 1\ 1\ 0\ 0.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0.\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0$$

Inverted Subnet mask:

$$0\ 0\ 0\ 0\ 0\ 0\ 0\ 0.\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0.\ 0\ 0\ 0\ 0\ 1\ 1\ 1\ 1.\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$$

Network Address OR Inverted Subnet mask:

$$\begin{aligned} &1\ 0\ 1\ 0\ 1\ 1\ 0\ 0.\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 1.\ 0\ 0\ 0\ 1\ 1\ 1\ 1\ 1.\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1 \\ &= 172.17.31.255 \end{aligned}$$

Therefore:

Network Address -> 172.17.16.0

Broadcast Address -> 172.17.31.255

2. 10.10.10.10/16

10.10.10.10 = 0 0 0 0 1 0 1 0 . 0 0 0 0 1 0 1 0 . 0 0 0 0 1 0 1 0 . 0 0 0 0 1 0 1 0  
/16 = 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

Find Network Address by using AND Operation:

0 0 0 0 1 0 1 0 . 0 0 0 0 1 0 1 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0  
= 10.10.0.0

Find Broadcast Address by using OR Operation:

Network Address:

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

Inverted Subnet Mask:

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

Network Address OR Inverted Subnet Mask:

0 0 0 0 1 0 1 0 . 0 0 0 0 1 0 1 0 . 1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1  
= 10.10.255.255

Therefore:

Network Address -> 10.10.0.0

Broadcast Address -> 10.10.255.255