Net-Practice

SOME DEFINITIONS

LAN - Local Area Network

WAN - Wide Are Network

SWITCH - Connects LAN devices

ROUTER - Forwards data between different networks

SUBNET - Defines LAN Range

ROUTER (GATEWAY) Functionality:

NAT - Network Address Translation

FIREWALL - set of passive rules to protect the network from unauthorized access.

DMZ - (demilitarize zone ?!)

ARP - Address Resolution Protocol

HTTP - Hyper Text Transfer Protocol

SSL - Secure Socket Layer

TLS - Transport Layer Security

HTTPS - HTTP secured with SSL/TSL

FTP - File Transfer Protocol

SMTP - Simple Mail Transfer Protocol

DNS - Domain Name System

IP Address = Host’s Identity on the Internet

SM - Subnet Mask

DG - Default Gateway (router’s IP address)

DHCP - Dynamic Host Config. Protocol

SOME MORE DEFINITIONS

Network Address Translation - remapping IP address for the trafic routing through the network.

PORT FORWARDING - redirects a communication request address and port number combination to another while the packets traversing a network gateway (router or firewall).

SUBNET MASK eg: (/24) == (255.255.255.0)

IP, SM and DG are necessary components to be able to speak to any FTP server in the internet given its IP address. And to speak to any other server (SMTP - mail, WEB - http) in the internet DNS’s IP is needed as well in order to translate server’s (public)address into its IP address.

So, IP, SM, DM and DNS must be configured on any host for it to be able to communicate with the internet.

DHCP is a protocol which configures IP, SM, DM, DSM for each host device automatically once it is connected to the (new/old) network.

Task Description and Walk-trough

TCP/IP - Transmission Control Protocol/Internet Protocol

UDP - User Datagram Protocol

CIDR - Classless Inter-domain Routing

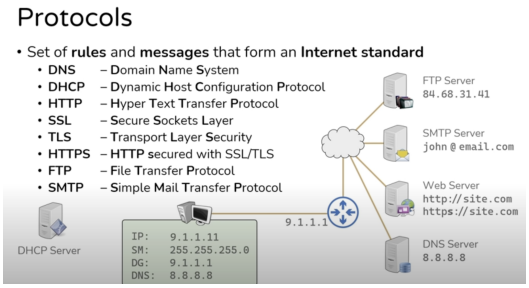
TCP/IP in Computer Networking - GeeksforGeeks

A Computer Science portal for geeks. It contains well written, well thought and well explained computer science and programming articles, quizzes and

https://www.geeksforgeeks.org/tcp-ip-in-computer-networking/

TCP/IP

SOME NOTES



Network Protocols - ARP, FTP, SMTP, HTTP, SSL, TLS, HTTPS, DNS, DHCP - Networking Fundamentals - L6

📖 Network Address:
The network address represents the beginning of a network and is used to identify the network itself. It is the lowest possible address within the network range. All devices within the same network share the same network address. In most cases, the network address is assigned as the first IP address in the available range.

📖 Broadcast Address:
The broadcast address represents the end of a network and is used to send data packets to all devices within that network. When a device sends a packet to the broadcast address, it is received by all devices on the same network. The broadcast address is the highest possible address within the network range. In most cases, the broadcast address is assigned as the last IP address in the available range.

```
/*
The range of available IP addresses within a network excludes the network address and the broadcast address.
These two addresses are reserved and have specific functions within the network infrastructure.

For example, let's consider a network with the IP address range of 192.168.0.0/24.
In this case, the network address would be 192.168.0.0,
and the broadcast address would be 192.168.0.255.

The available IP addresses within this network would range from 192.168.0.1 to 192.168.0.254,
excluding the network and broadcast addresses.
*/
```

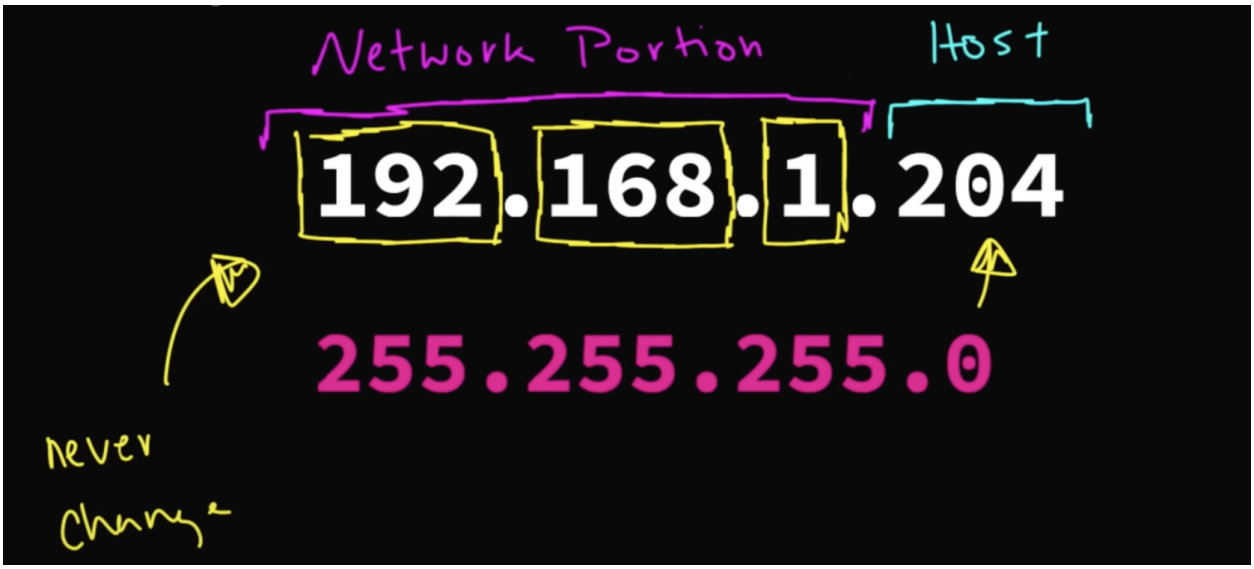
📖 A subnet mask is a 32-bit value used in conjunction with an IP address to determine the network and host portions of the address. It is represented in the form of four sets of octets, each containing 8 bits, separated by periods. For example, the subnet mask `255.255.0.0` is represented as `11111111.11111111.00000000.00000000` in binary form.

```
/*
The subnet mask's purpose is to divide an IP address into two parts:
the network portion and the host portion.
The bits that are set to 1 in the subnet mask represent the network portion,
while the bits set to 0 represent the host portion.

The subnet mask determines the size of the network and the number of available hosts within it.
By varying the subnet mask, you can create smaller or larger networks.

To determine the IP address range based on the subnet mask, you follow these steps:

1. Convert the subnet mask to binary form.
2. Identify the network portion by looking at the 1s in the binary subnet mask.
3. Calculate the number of bits in the network portion. In the example `255.255.0.0`,
    there are 16 bits in the network portion.
4. Determine the number of available hosts within the network by calculating 2^(number of host bits) - 2.
    The -2 accounts for the network address and the broadcast address,
    which are not available for host assignment.
5. Calculate the IP address range by incrementing the network address by 1 and decrementing the broadcast address by 1.

For example, with the subnet mask `255.255.0.0`,
the network portion consists of the first 16 bits, and the host portion consists of the last 16 bits.
This allows for 2^16 - 2 = 65,534 available hosts within the network.

If the IP address is 192.168.0.0, the range of available IP addresses within this network
would be from 192.168.0.1 to 192.168.255.254.
*/
```

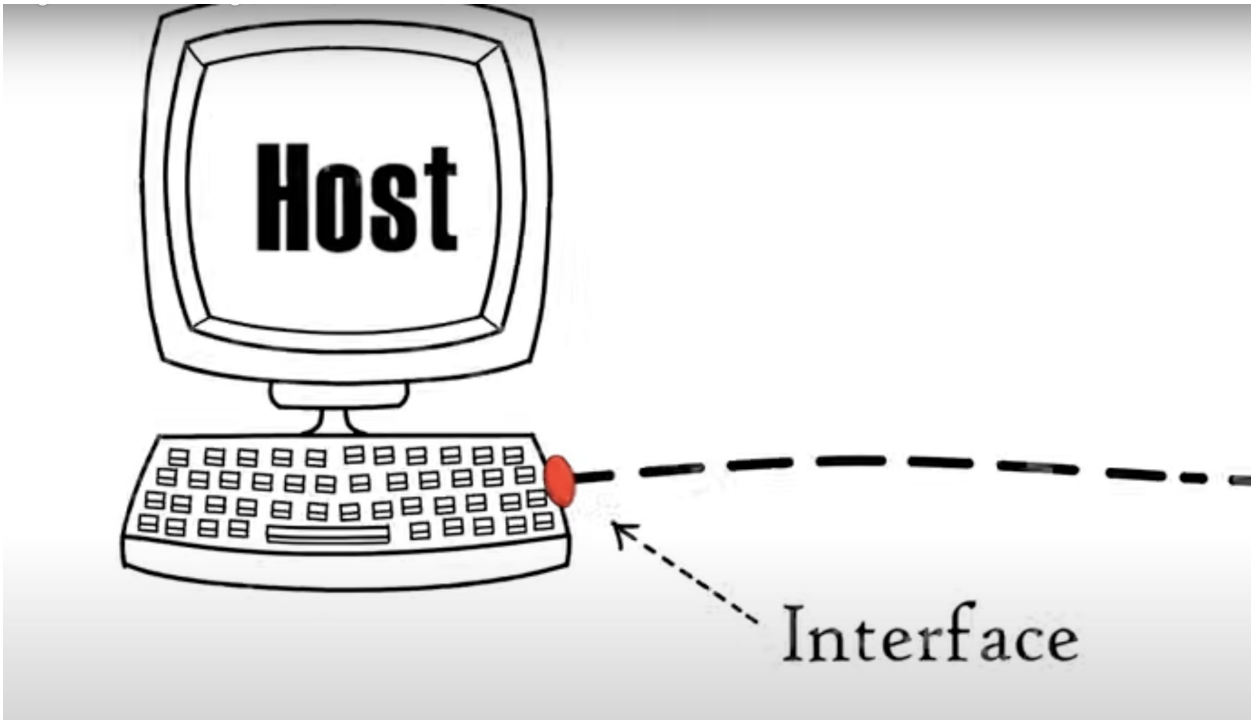
To calculate the range of IP addresses given an IP `163.172.250.12` address and net-mask: `255.255.255.240`, you can follow these steps: 1. Convert the IP address and netmask to binary representation. IP: `163.172.250.12` (binary: `10100011.10101100.11111010.00001100`) Netm-ask: `255.255.255.240` (binary: `11111111.11111111.11111111.11110000`) 2. Determine the network address by performing a bitwise logical AND operation between the IP address and netmask. Network address: `163.172.250.0` (binary: `10100011.10101100.11111010.00000000`) 3. Calculate the number of hosts available in the network. In this case, the netmask `/28` allows for 16 (2^(32-28)) host addresses. 4. Determine the range of IP addresses by adding 1 to the network address to get the first usable IP address and subtracting 1 from the broadcast address to get the last usable IP address. First usable IP: `163.172.250.1` Last usable IP: `163.172.250.14` Therefore, the range of IP addresses for the given IP `163.172.250.12` and netmask `255.255.255.240` is from `163.172.250.1` to `163.172.250.14`.

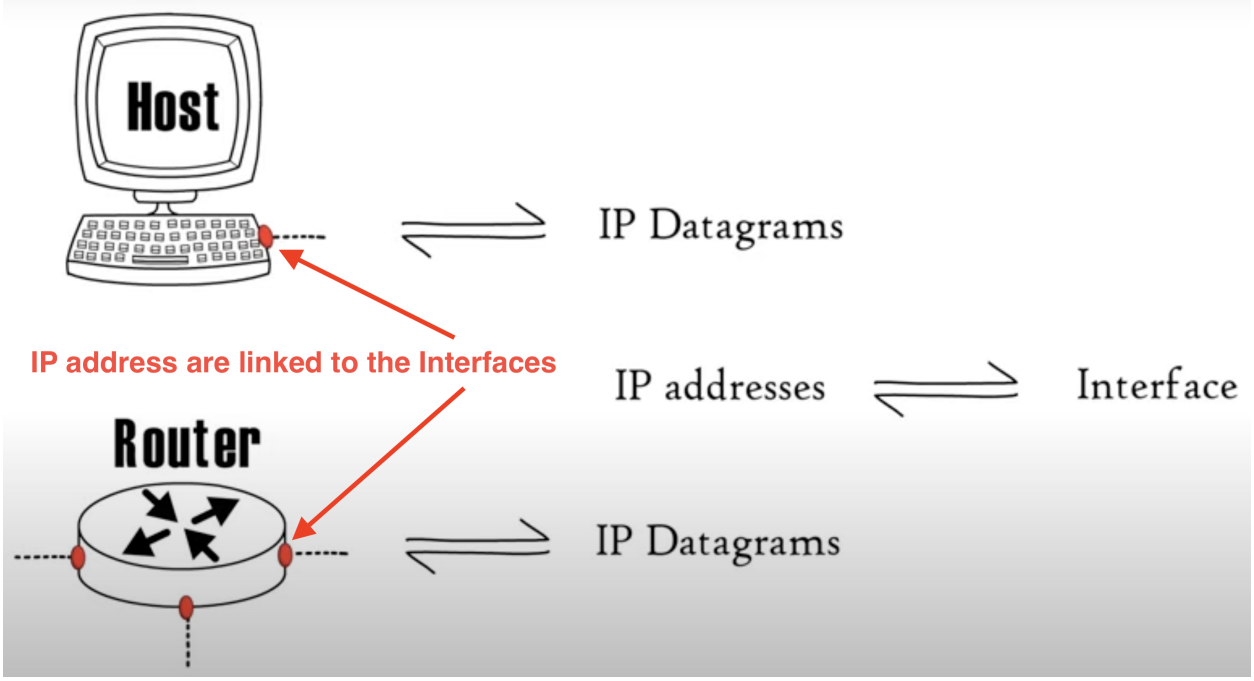
To determine the network address using bitwise operations, you need to perform a bitwise logical AND operation between the IP address and the netmask. IP address: `163.172.250.12` (binary: `10100011.10101100.11111010.00001100`) Netmask: `255.255.255.240` (binary: `11111111.11111111.11111111.11110000`) Now, we can perform the bitwise AND operation between the IP address and the net-mask, bit by bit: `IP address: 10100011.10101100.11111010.00001100 Netmask: 11111111.11111111.11111111.11110000 AND result: 10100011.10101100.11111010.00000000` The result of the bitwise AND operation gives you the network address: `163.172.250.0`

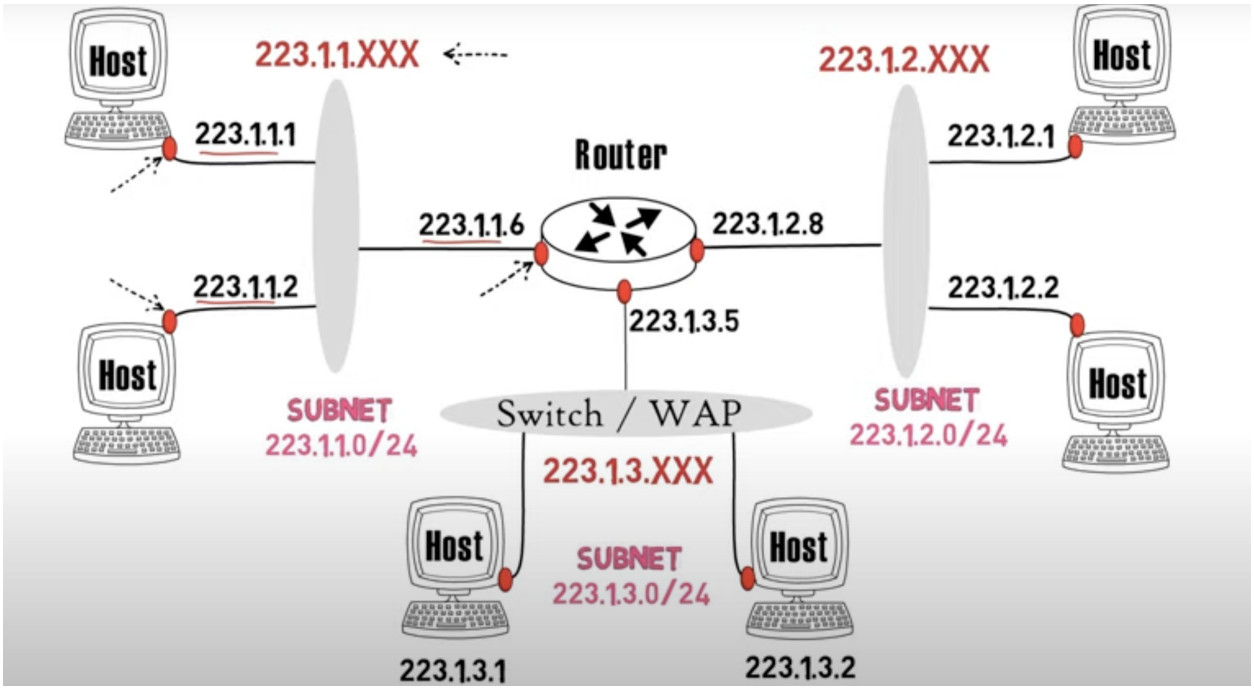
The network portion of the IP address stay static along the network.



https://www.youtube.com/watch?v=5WfiTHiU4x8

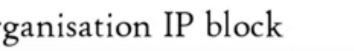



Host
IP Datagrams
IP address are linked to the Interfaces
IP addresses
Interface
Router
IP Datagrams


Host
223.1.1.XXX
223.1.2.XXX
Host
223.1.1.1
Router
223.1.2.1
223.1.1.6
223.1.2.8
223.1.1.2
223.1.2.2
223.1.3.5
Host
Host
SUBNET
223.1.1.0/24
Switch / WAP
SUBNET
223.1.2.0/24
223.1.3.XXX
Host
Host
SUBNET
223.1.3.0/24
223.1.3.1
223.1.3.2

Subnet Address : a.b.c.d/x

11001000 00010111 00010000 00000000



Network prefix

Organisation IP block — Binary form

200.23.16.0/20 — 11001000 00010111 00010000 00000000

X = 20

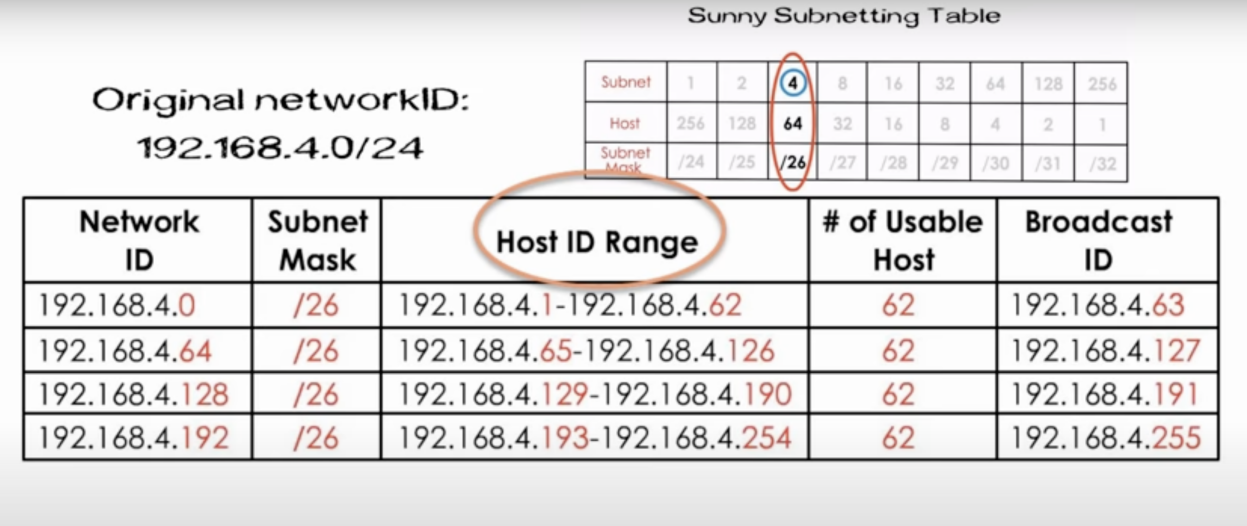
Organisation IP block — Binary form

200.23.16.0/20 — 11001000 00010111 00010000 00000000

X = 20

Subnet 0	200.23.16.0/23	11001000 00010111 00010000 00000000
Subnet 1	200.23.18.0/23	11001000 00010111 00010010 00000000
Subnet 2	200.23.20.0/23	11001000 00010111 00010100 00000000

Subnet	1	2	4	8	16	32	64	128	256
Host	256	128	64	32	16	8	4	2	1
Subnet Mask	/24	/25	/26	/27	/28	/29	/30	/31	/32



Sunny Subnetting Table

Subnet	1	2	4	8	16	32	64	128	256
Host	256	128	64	32	16	8	4	2	1
Subnet Mask	/24	/25	/26	/27	/28	/29	/30	/31	/32

Original networkID:
192.168.4.0/24

Network ID	Subnet Mask	Host ID Range	# of Usable Host	Broadcast ID
192.168.4.0	/26	192.168.4.1-192.168.4.62	62	192.168.4.63
192.168.4.64	/26	192.168.4.65-192.168.4.126	62	192.168.4.127
192.168.4.128	/26	192.168.4.129-192.168.4.190	62	192.168.4.191
192.168.4.192	/26	192.168.4.193-192.168.4.254	62	192.168.4.255

1. Level 1
2. Level 2
3. Level 3
4. Level 4
5. Level 5
6. Level 6
7. Level 7
8. Level 8
9. Level 9
10. Level 10