

An IP address is a unique address that identifies a device on the Internet or a local network. IP stands for "Internet Protocol", which is a set of rules governing the format of data sent via Internet or local network.

There are 4 types of IP addresses, i.e.: public, private, static & dynamic.

An IP (Internet Protocol) address is a numerical label such as 192.168.3.200 that is connected to an computer network that uses IP protocol for communications.

An IP address serves two main purposes: host or network interface identification and location addressing.

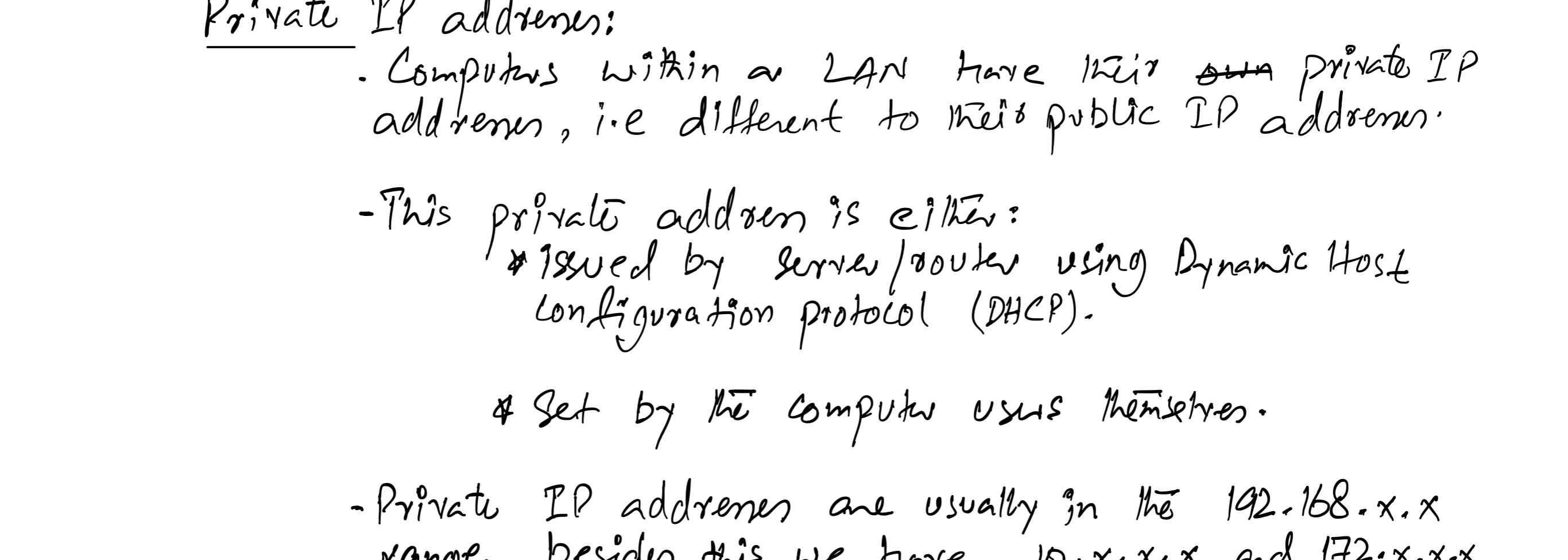
IPv4:

IP Version 4 defines an IP address as a 32-bit number.

IP addresses are written and displayed in human readable form/notations, such as 192.168.0.30 in IPv4.

The IP address space is managed by a global body known as Internet Assigned Numbers Authority.

(Range: 0-255) → Octet range.



Public IP addresses:

- Each LAN connected to Internet has a single IP address. This address is seen by other networks or computers on network. This IP address is attached to all packets sent across the Internet.

- Public IP address has two types: Static & Dynamic.

- Public IP address are assigned by the ISP upon the connection with the Internet.

Private IP addresses:

- Computers within a LAN have their own private IP addresses, i.e. different to their public IP address.

- This private address is either:

* Issued by server/router using Dynamic Host Configuration protocol (DHCP).

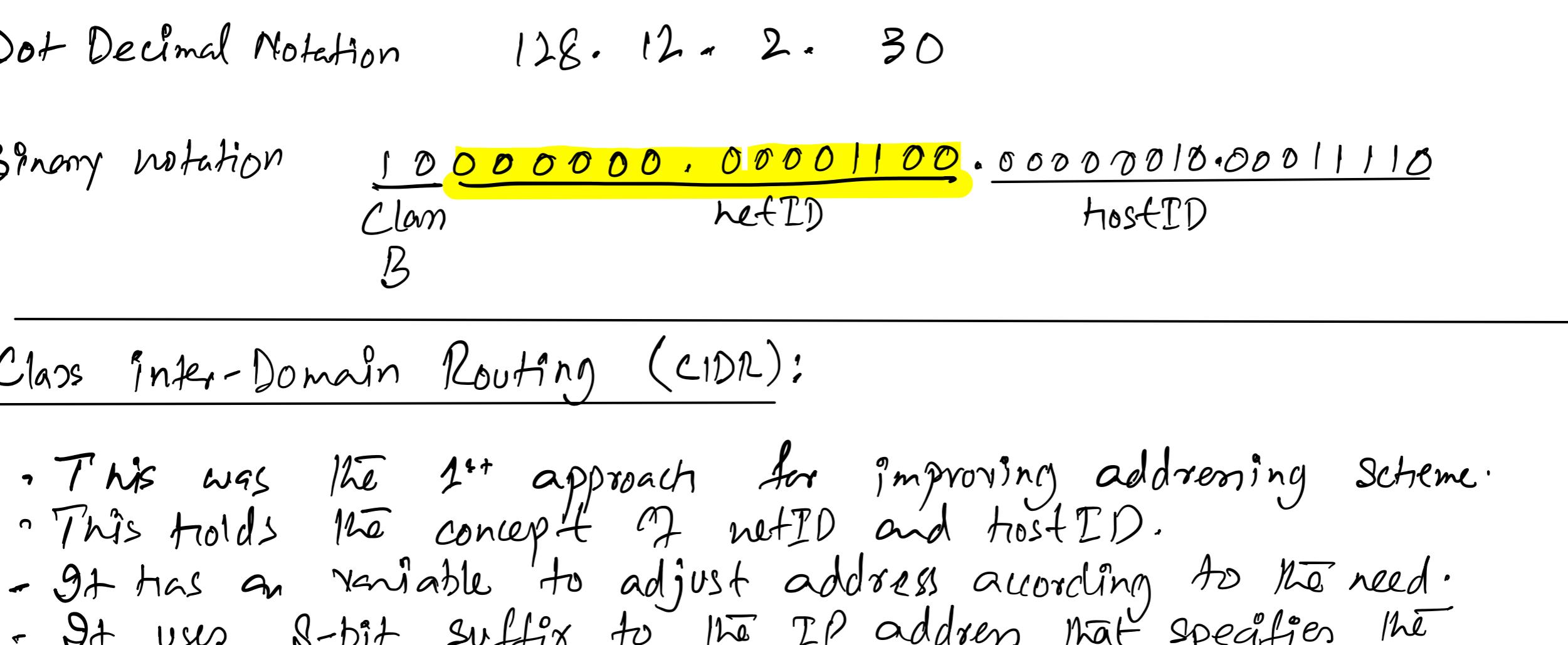
* Set by the computer users themselves.

- Private IP addresses are usually in the 192.168.x.x range, besides this we have 10.x.x.x and 172.x.x.x.

Network Address Translation (NAT):

When a user sends a packet from a computer to server, the NAT server swaps the private IP address for the public IP address and also attaches a port id to the packet.

The NAT server keeps the track of which host/node/computer is assigned to which private IP address (routing table), when the packet is returned NAT swaps back the public IP add. on the packet back to related private IP address. Then packet is sent to the related node via LAN.



Network Address Translation (NAT)

192.168.0.4 ↔ 192.168.0.0:4 ↔ 23.68.205.3:4

192.168.0.3 → 192.168.0.0:3

Socket

(Internet Packet)

192.168.0.4:28 → Port

$2^{16} = 65K$

62.25.3.85:8080

website

IPv4 Addressing Approaches:

For Public IP addresses (mostly).

IPv4 Format: B.B.B.B = $2^3 \cdot 4\text{Bit}$. Approx.

- Original IP add. was designed on the basis of hierarchical addresses.

- These addresses, though written as one, are divided on binary level into groups of bits called octet.

- These groups define a network ID (net ID) and host ID.

- The aim was to assign a unique, universal add to each node.

- Other features of original IPv4 formatting scheme were based on classes of networks.

- There are 5 classes, but we only study 3 of those.

- Class identifier bits are not included in netID.

- It can be observed that the most significant bits identify the class.

Dot Decimal Notation 128.12.2.30

Binary notation 10000000.0001100.0000010.0001110
Class netID HostID

Class Inter-Domain Routing (CIDR):

- This was the 1st approach for improving addressing scheme.

- This holds the concept of netID and hostID.

- It has a variable to adjust address according to need.

- It uses 8-bit suffix to the IP address that specifies the number of bits for netID and remaining bits for hostID.

100000000000110000000010001110 / 00010101 Suffix

netID

hostID

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- It can be observed that the most significant bits identify the class.

Dot Decimal Notation 128.12.2.30

Binary notation 10000000.0001100.0000010.0001110
Class netID HostID

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Class netID HostID</p