SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME :19EE603 IoT for Electrical Engineers

III YEAR /VI SEMESTER

Unit 3- Communication Interface

IP Addressing

What is IP Addressing??

IP Addressing

- An Internet Protocol (IP) address is the unique identifying number assigned to every device connected to the internet. An IP address definition is a numeric label assigned to devices that use the internet to communicate.
- Computers that communicate over the internet or via local networks share information to a specific location using IP addresses.

How Does an IP Address Work?

- An IP address works in helping your device, whatever you are accessing the internet on, to find whatever data or content is located to allow for retrieval.
- Common tasks for an IP address include both the identification of a host or a network, or identifying the location of a device. An IP address is not random. The creation of an IP address has the basis of math.
- The Internet Assigned Numbers Authority (IANA) allocates the IP address and its creation. The full range of IP addresses can go from 0.0.0.0 to 255.255.255.255.

Public IP Address

- A public IP address, or external-facing IP address, applies to the main device people use to connect their business or home internet network to their internet service provider (ISP). In most cases, this will be the router. All devices that connect to a router communicate with other IP addresses using the router's IP address.

- Knowing an external-facing IP address is crucial for people to open ports used for online gaming, email and web servers, media streaming, and creating remote connections.

Private IP Address

- A private IP address, or internal-facing IP address, is assigned by an office or home intranet (or local area network) to devices, or by the internet service provider (ISP).
- The home/office router manages the private IP addresses to the devices that connect to it from within that local network. Network devices are thus mapped from their private IP addresses to public IP addresses by the router.

Static IP Address

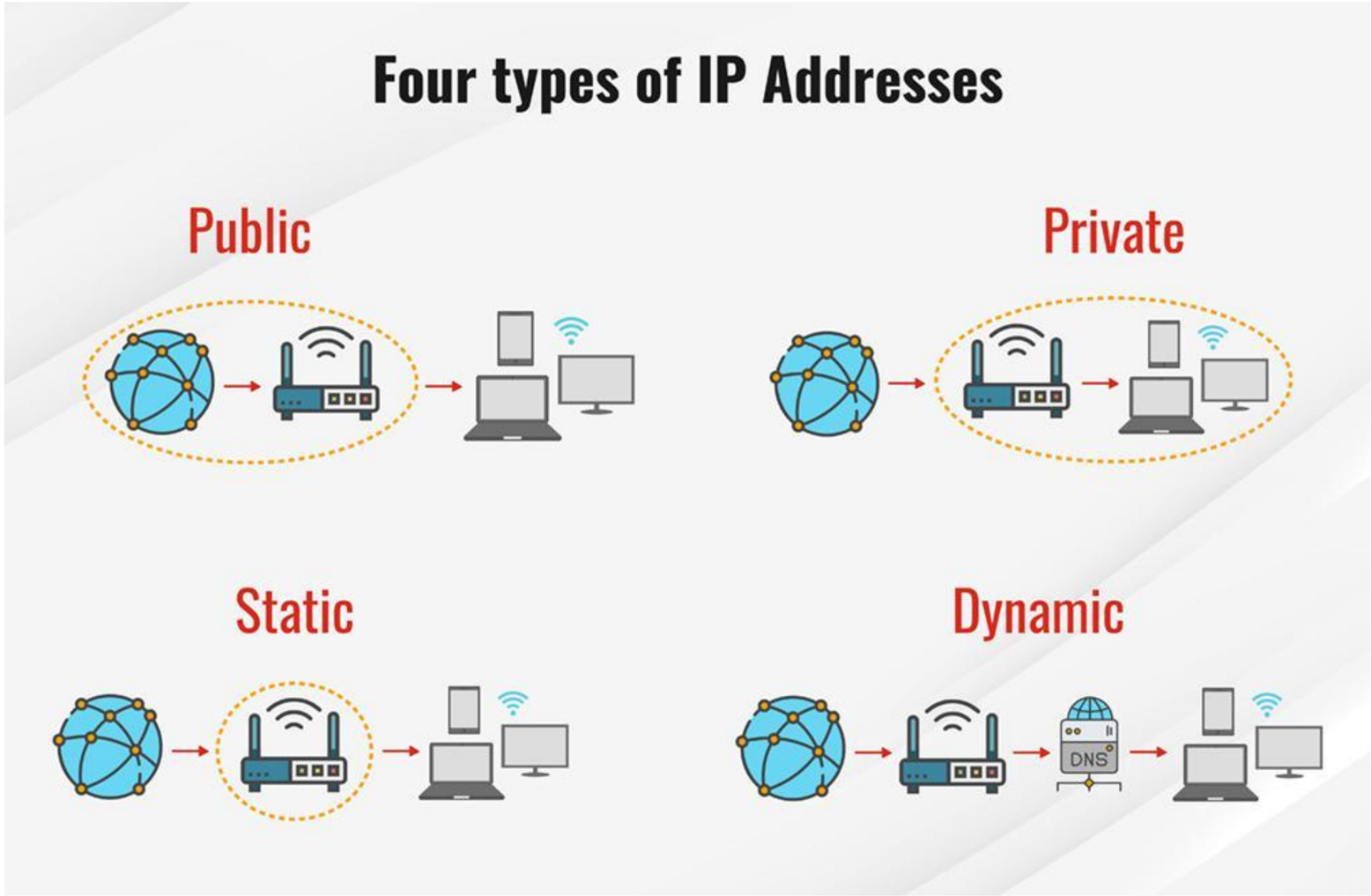
- All public and private addresses are defined as static or dynamic. An IP address that a person manually configures and fixes to their device's network is referred to as a static IP address.
- A static IP address cannot be changed automatically. An internet service provider may assign a static IP address to a user account. The same IP address will be assigned to that user for every session.

Dynamic IP Address

- A dynamic IP address is automatically assigned to a network when a router is set up. The Dynamic Host Configuration Protocol (DHCP) assigns the distribution of this dynamic set of IP addresses. The DHCP can be the router that provides IP addresses to networks across a home or an organization.

- Each time a user logs into the network, a fresh IP address is assigned from the pool of available (currently unassigned) IP addresses. A user may randomly cycle through several IP addresses across multiple sessions.

Types of IP Addressing



What Is IPv4?

- IPv4 is the fourth version of the IP. It is one of the core protocols of the standards-based methods used to interconnect the internet and other networks.
- The protocol was first deployed on the Atlantic Packet Satellite Network (SATNET), which was a satellite network that formed a segment of the initial stages of the internet, in 1982. It is still used to route most internet traffic despite the existence of IPv6.
- IPv4 is currently assigned to all computers. An IPv4 address uses 32-bit binary numbers to form a unique IP address. It takes the format of four sets of numbers, each of which ranges from 0 to 255 and represents an eight-digit binary number, separated by a period point.

IP Address Classes

Some IP addresses are reserved by the Internet Assigned Numbers Authority (IANA). These are typically reserved for networks that carry a specific purpose on the Transmission Control Protocol/Internet Protocol (TCP/IP), which is used to interconnect devices.

0.0.0.0: This IP address in IPv4 is also known as the default network. It is the non-routeable meta address that designates an invalid, non-applicable, or unknown network target.

127.0.0.1: This IP address is known as the loopback address, which a computer uses to identify itself regardless of whether it has been assigned an IP address.

169.254.0.1 to 169.254.254.254: A range of addresses that are automatically assigned if a computer is unsuccessful in an attempt to receive an address from the DHCP.

255.255.255.255: An address dedicated to messages that need to be sent to every computer on a network or broadcasted across a network.

Subnet classes

Subnetworks are small computer networks that connect to a bigger network via a router. The subnet can be assigned its own IP address system, so that all devices connecting to it can communicate with each other without having to send data via the wider network.

Class A: IP addresses between 10.0.0.0 and 10.255.255.255

Class B: IP addresses between 172.16.0.0 and 172.31.255.255

Class C: IP addresses between 192.186.0.0 and 192.168.255.255

Class D or multicast: IP addresses between 224.0.0.0 and 239.255.255.255

Class E, which are reserved for experimental usage: IP addresses between 240.0.0.0 and 254.255.255.254

IPv4 vs. IPv6

IPv4 has not been able to cope with the massive explosion in the quantity and range of devices beyond simply mobile phones, desktop computers, and laptops. The original IP address format was not able to handle the number of IP addresses being created.

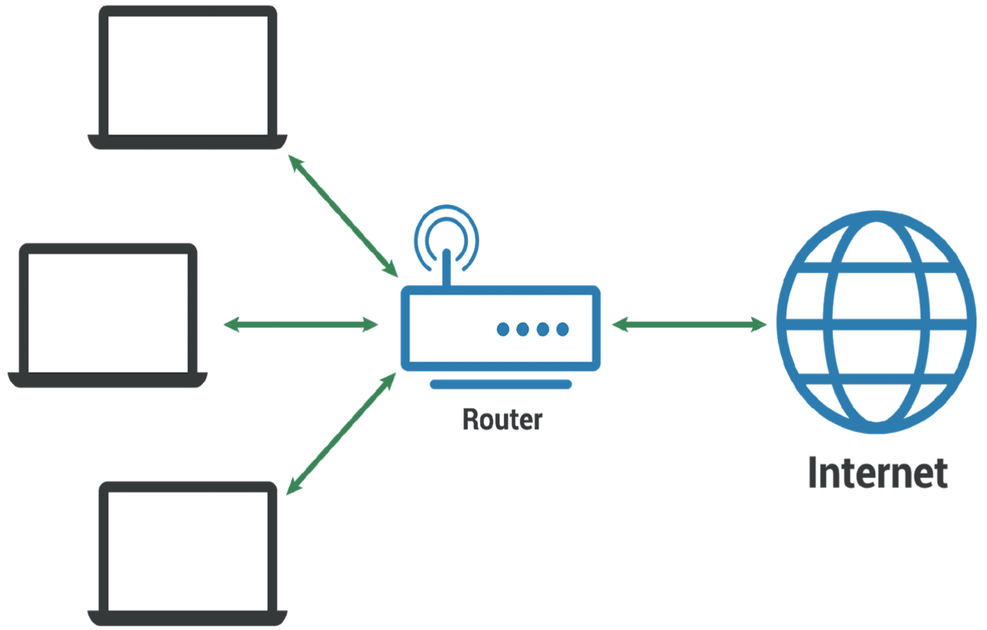
To address this problem, IPv6 was introduced. This new standard operates a hexadecimal format that means billions of unique IP addresses can now be created. As a result, the IPv4 system that could support up to around 4.3 billion unique numbers has been replaced by an alternative that, theoretically, offers unlimited IP addresses.

That is because an IPv6 IP address consists of eight groups that contain four hexadecimal digits, which use 16 distinct symbols of 0 to 9 followed by A to F to represent values of 10 to 15.

Types of Network

Local Area Network:

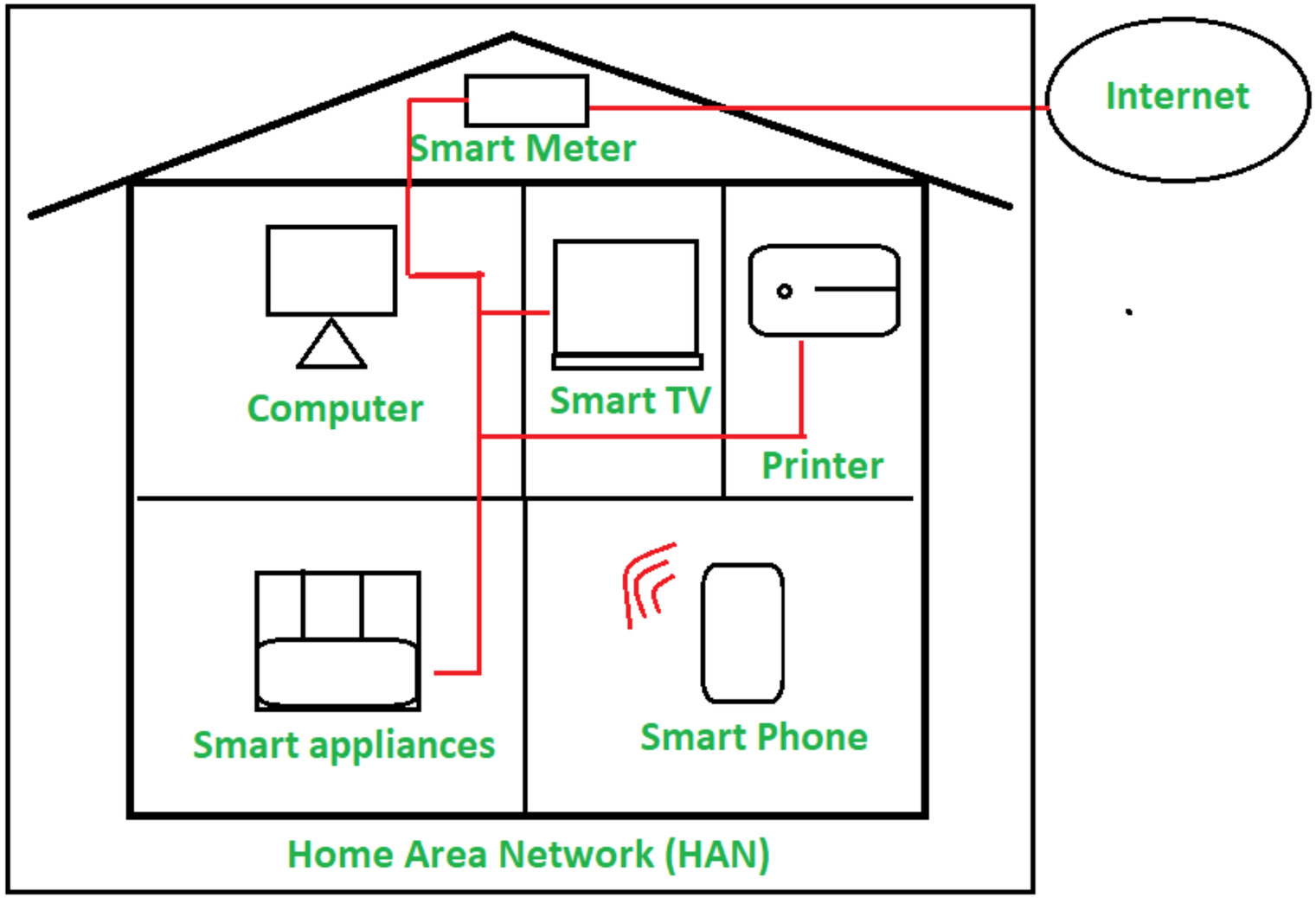
A local area network (LAN) is a collection of devices connected together in one physical location, such as a building, office, or home. A LAN can be small or large, ranging from a home network with one user to an enterprise network with thousands of users and devices in an office or school.



Home Area Network (HAN)

- Home Area Network (HAN) is a network in a user's home where all the laptops, computers, smartphones, and other smart appliances and digital devices are connected into a network.
- This facilitates communication among the digital devices within a home which are connected to the Home network.
- Home Area Network may be wired or wireless. Mostly wireless network is used for HAN. One centralized device is there for the function of Network Address Translation (NAT).
- This Home Area Network enables communication and sharing of resources between the smart devices over a network connection.

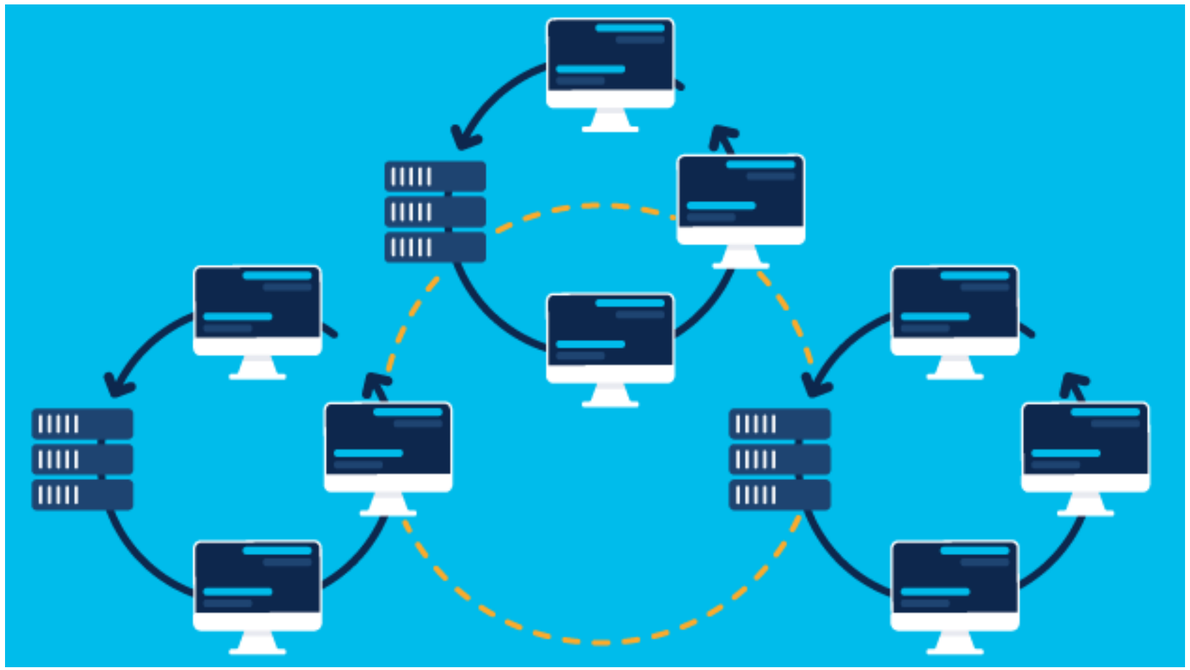
Home Area Network (HAN)



Wide Area Network

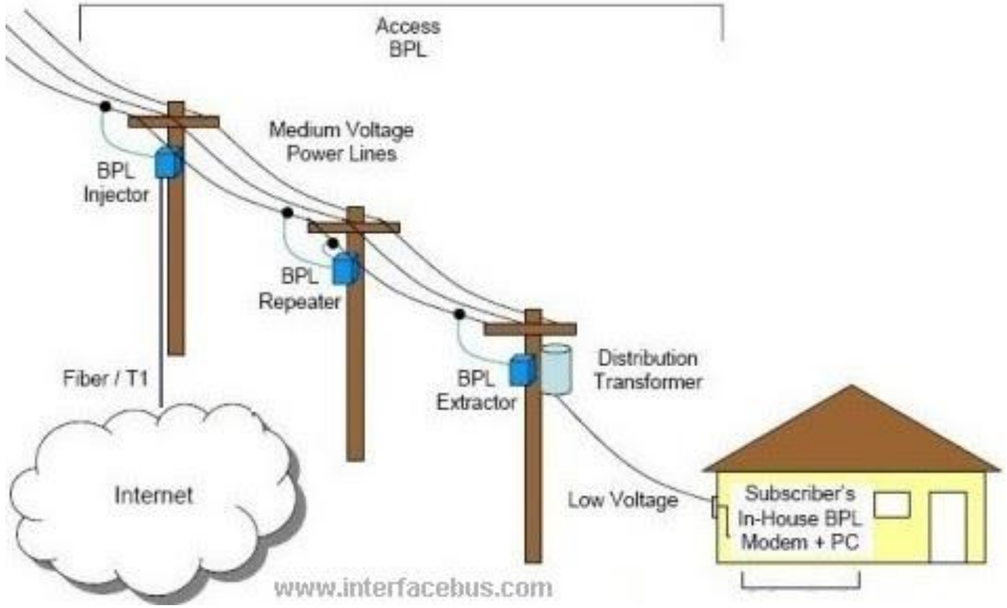
- In its simplest form, a wide-area network (WAN) is a collection of local-area networks (LANs) or other networks that communicate with one another. A WAN is essentially a network of networks, with the Internet the world's largest WAN.

- Today, there are several types of WANs, built for a variety of use cases that touch virtually every aspect of modern life.



Broadband over power lines

- Broadband over power lines (BPL) is a method of power-line communication (PLC) that allows relatively high-speed digital data transmission over public electric power distribution wiring.
- BPL uses higher frequencies, a wider frequency range, and different technologies compared to other forms of power-line communications to provide high-rate communication over longer distances.
- BPL uses frequencies that are part of the radio spectrum allocated to over-the-air communication services; therefore, the prevention of interference to, and from, these services is a very important factor in designing BPL systems.



Assessment

How Do I Locate My IP Address?

References

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