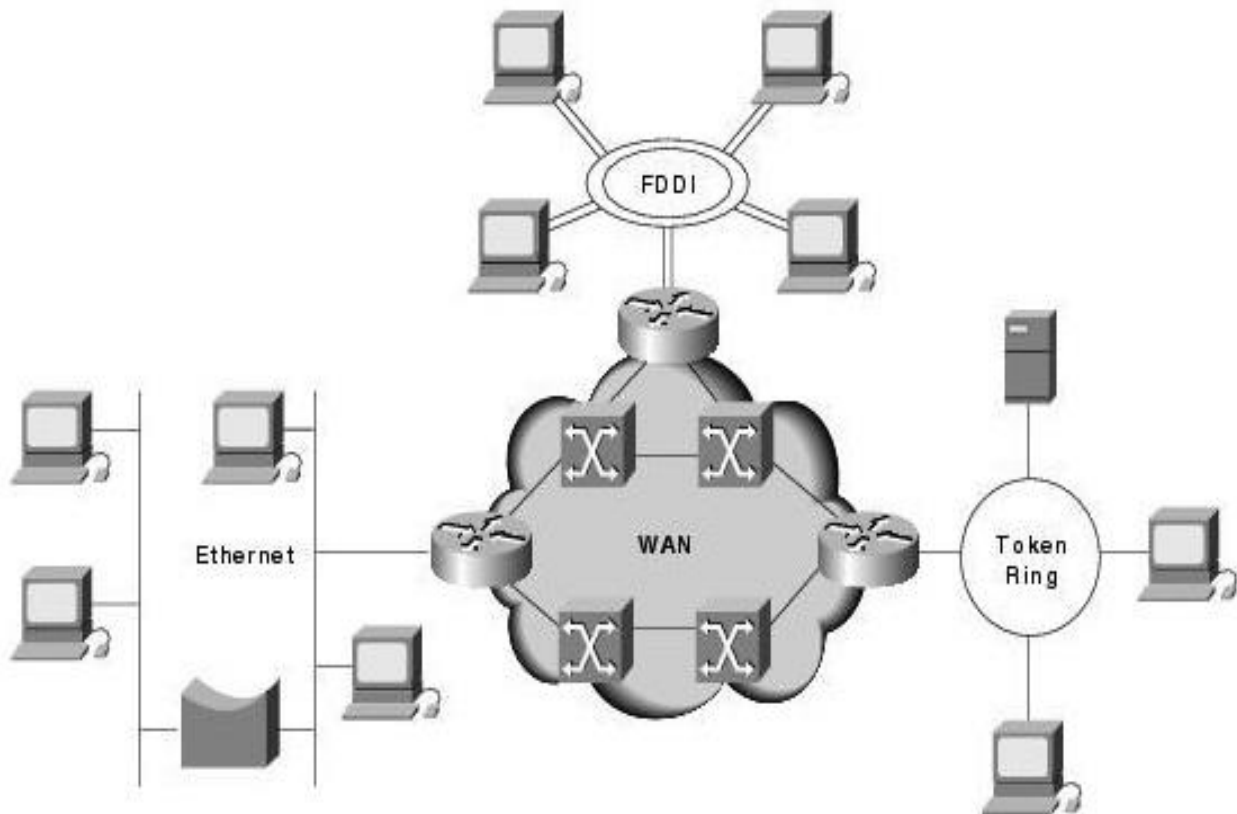## Basic Internetworking (IP, CIDR, ARP, BOOTP DHCP, ICMP)

Internetworking is a collection of individual networks, connected by intermediate networking devices, that functions as a single large network. It refers to the industry, products, and procedures that meet the challenge of creating and administering internetworks.

Internetworking is the practice of interconnecting multiple computer networks, such that any pair of hosts in the connected networks can exchange messages irrespective of their hardware-level networking technology.

Challenges faced by internetworking are:

- Connectivity
- Reliability
- Network Management
- Flexibility

Protocols present in Internetworking:

- **IP(Internet Protocol)**
- The Internet Protocol (IP) is a protocol, or set of rules, for routing and addressing packets of data so that they can travel across networks and arrive at the correct destination.
- Data traversing the Internet is divided into smaller pieces, called packets.

- IP information is attached to each packet, and this information helps <u>routers</u> to send packets to the right place.
- Every device or <u>domain</u> that connects to the Internet is assigned an <u>IP address</u>, and as packets are directed to the IP address attached to them, data arrives where it is needed.

Working of IP:

- An IP address is a unique identifier assigned to a device or domain that connects to the Internet.
- Each IP address is a series of characters, such as '192.168.1.1'. Via <u>DNS</u> resolvers, which translate human-readable domain names into IP addresses, users are able to access websites without memorizing this complex series of characters.
- Each IP packet will contain both the IP address of the device or domain sending the packet and the IP address of the intended recipient, much like how both the destination address and the return address are included on a piece of mail.
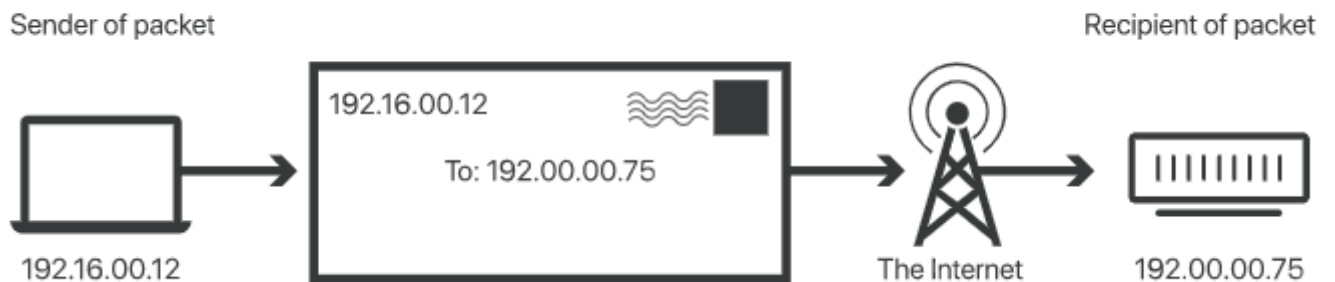
- **CIDR(ClassLess Inter-Domain Routing)**
- CIDR, which stands for Classless Inter-Domain Routing, is an IP addressing scheme that improves the allocation of IP addresses.
- It replaces the old system based on classes A, B, and C.
- This scheme also helped greatly extend the life of IPv4 as well as slow the growth of routing tables.

Working of CIDR:

- CIDR is based on <u>variable-length subnet masking</u> (VLSM). This allows it to define prefixes of arbitrary lengths making it much more efficient than the old system.
- CIDR IP addresses are composed of two sets of numbers. The network address is written as a prefix, like you would see a normal IP address (e.g. 192.255.255.255).
- The second part is the suffix which indicates how many bits are in the entire address (e.g. /12). Putting it together, a CIDR IP address would look like the following:

192.255.255.255/12

- **ARP(Address Resolution Protocol)**

Address Resolution Protocol(ARP)

The purpose of Address Resolution Protocol (ARP) is to resolve an IPv4 address (32 bit Logical Address) to the corresponding physical address (48 bit MAC Address). Network Applications at the Application Layer use IPv4 Address to communicate with another device.

Aim: To find out the MAC address of the destination that allows us to communicate with other devices. In this case, the ARP is actually required as it converts the IP address to a physical address.

Working of ARP:

Arping probes hosts on the examined network link by sending Link Layer frames using the Address Resolution Protocol (ARP) request method addressed to a host identified by its MAC address of the network interface.

- **RARP(Reverse Address Resolution Protocol)**

Reverse ARP (RARP) is a networking protocol used by the client system in a local area network (LAN) to request its IPv4 address from the ARP gateway router table. A table is created by the network administrator in the gateway-router that is used to find out the MAC address to the corresponding IP address.

Working of RARP:

The RARP is on the Network Access Layer and is employed to send data between two points in a very network.The client broadcasts a RARP request with an Ethernet broadcast address and with its own physical address. The server responds by informing the client its IP address.