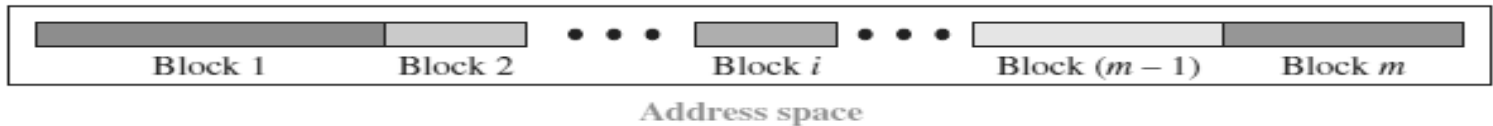# CLASSLESS ADDRESSING

- In classless addressing, variable-length blocks are used that belong to no classes.

- We can have a block of 1 address, 2 addresses, 4 addresses, 128 addresses, and so on.

- In classless addressing, the whole address space is divided into variable length blocks.

- The prefix in an address defines the block (network); the suffix defines the node (device).

- The number of addresses in a block needs to be a power of 2.

- An organization can be granted one block of addresses.

CLASSLESS ADDRESSING

| Block 1 | Block 2 | • • • | Block i | • • • | Block $(m-1)$ | Block m |

Address space

- The prefix length in classless addressing is variable.
- We can have a prefix length that ranges from 0 to 32.
- The size of the network is inversely proportional to the length of the prefix.
- A small prefix means a larger network; a large prefix means a smaller network.
- The idea of classless addressing can be easily applied to classful addressing.
- An address in class A can be thought of as a classless address in which the prefix length is 8.
- An address in class B can be thought of as a classless address in which the prefix is 16, and so on. In other words, classful addressing is a special case of classless addressing.

Notation used in Classless Addressing

- The notation used in classless addressing is informally referred to as slash notation and formally as classless interdomain routing or CIDR.

- For example , 192.168.100.14 **/24** represents the IP address 192.168.100.14 and, its subnet mask 255.255.255.0, which has 24 leading 1-bits.

byte	•	byte	•	byte	•	byte	/	n

Prefix length
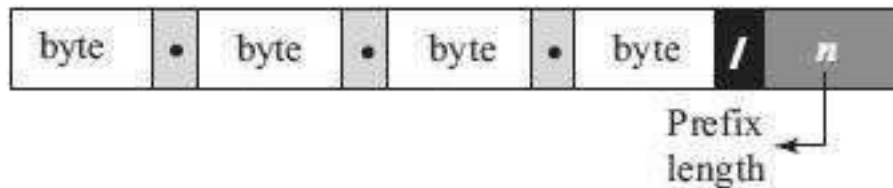
Examples:
12.24.76.8/8
23.14.67.92/12
220.8.24.255/25

Address Aggregation

- One of the advantages of the CIDR strategy is **address aggregation** (sometimes called *address summarization* or *route summarization*).

- When blocks of addresses are combined to create a larger block, routing can be done based on the prefix of the larger block.

- ICANN(Internet Corporation for Assigned Names and Numbers) assigns a large block of addresses to an ISP.

- Each ISP(Internet Service Provider) in turn divides its assigned block into smaller subblocks and grants the subblocks to its ccustomers.

This-host Address

- The only address in the block **0.0.0.0**/**32** is called the *this-host* address.

- It is used whenever a host needs to send an IP datagram but it does not know its own address to use as the source address.

Limited-broadcast Address

- The only address in the block **255.255.255.255/32** is called the *limitedbroadcast* address.

- It is used whenever a router or a host needs to send a datagram to all devices in a network.

- The routers in the network, however, block the packet having this address as the destination;the packet cannot travel outside the network.

Loopback Address

- The block **127.0.0.0/8** is called the *loopback* address.

- A packet with one of the addresses in this block as the destination address never leaves the host; it will remain in the host.

Private Addresses

- Four blocks are assigned as private addresses: 10.0.0.0/**8**, 172.16.0.0/**12**,

- 192.168.0.0/**16**, and 169.254.0.0/**16**.

Multicast Addresses

- The block 224.0.0.0/**4** is reserved for multicast addresses.

DHCP – DYNAMIC HOST CONFIGURATION PROTOCOL

- The dynamic host configuration protocol is used to simplify the installation and maintenance of networked computers.
- DHCP is derived from an earlier protocol called BOOTP.
- Ethernet addresses are configured into network by manufacturer and they are unique.
- IP addresses must be unique on a given internetwork but also must reflect the structure of the internetwork.
- The main goal of DHCP is to minimize the amount of manual configuration required for a host.

- If a new computer is connected to a network, DHCP can provide it with all the necessary information for full system integration into the network.
- DHCP is based on a client/server model.
- DHCP clients send a request to a DHCP server to which the server responds with an IP address
- DHCP server is responsible for providing configuration information to hosts.
- There is at least one DHCP server for an administrative domain.
- The DHCP server can function just as a centralized repository for host configuration information.
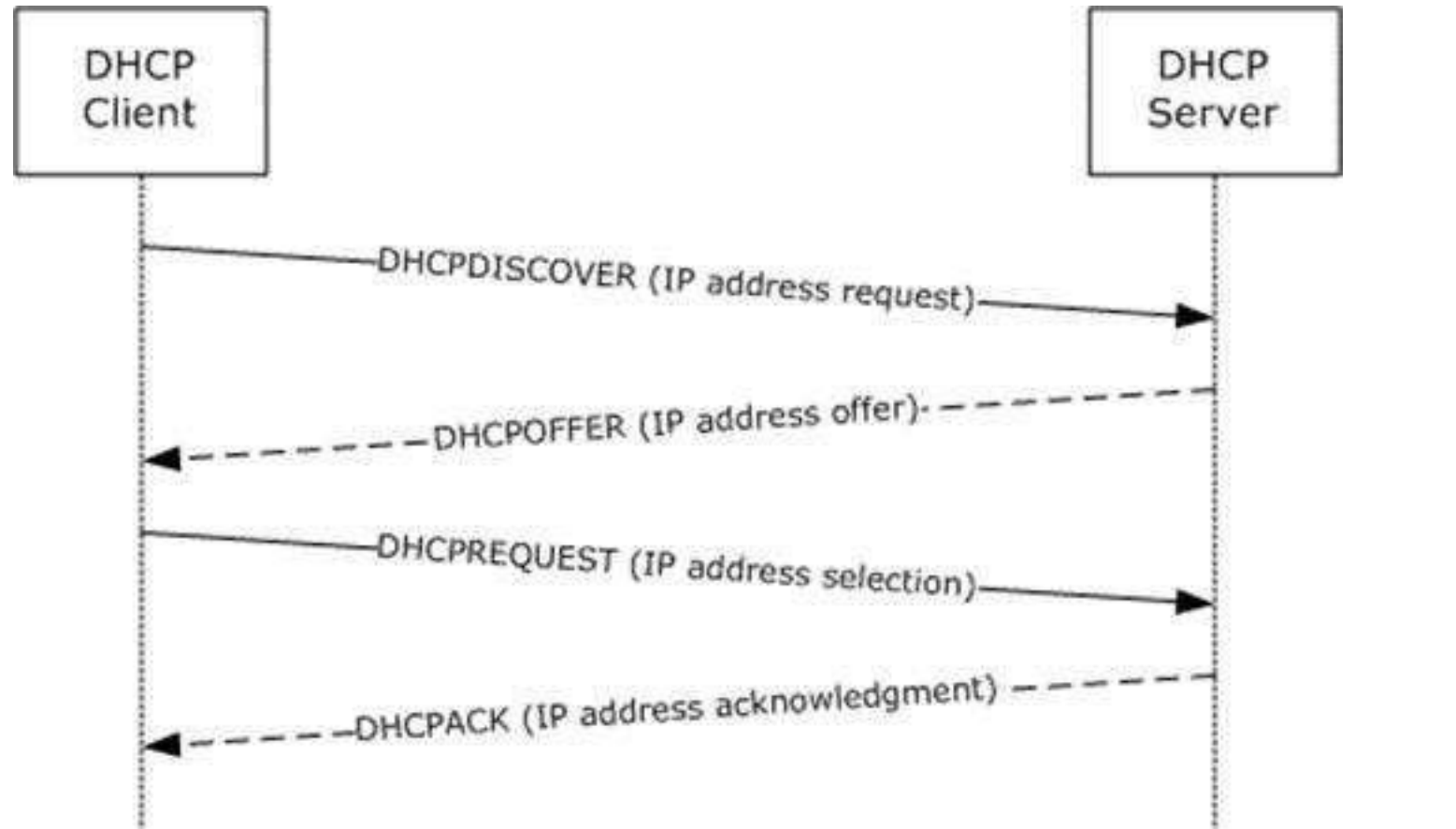- The DHCP server maintains a pool of available addresses that it hands out to hosts on demand.

DHCP – DYNAMIC HOST CONFIGURATION PROTOCOL
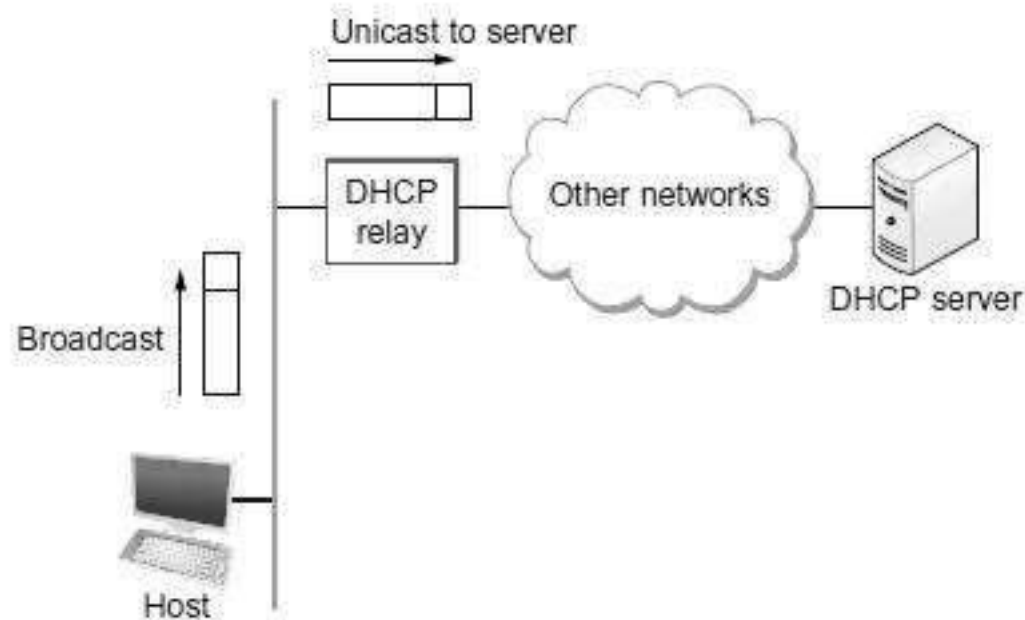
DHCP – DYNAMIC HOST CONFIGURATION PROTOCOL

- A newly booted or attached host sends a DHCPDISCOVER message to a special IP address (255.255.255.255., which is an IP broadcast address.

- This means it will be received by all hosts and routers on that network.

- DHCP uses the concept of a *relay agent.* There is at least one relay agent on each network.

- DHCP relay agent is configured with the IP address of the DHCP server.

- When a relay agent receives a DHCPDISCOVER message, it unicasts it to the DHCP server and awaits the response, which it will then send back to the requesting client.

DHCP – DYNAMIC HOST CONFIGURATION PROTOCOL

DHCP Message Format

0	8	16	24	31
Opcode	Htype	HLen	HCount
Transaction ID			
Time elapsed		Flags	
Client IP address			
Your IP address			
Server IP address			
Gateway IP address			
Client hardware address			
Server name			
Boot file name			
Options			