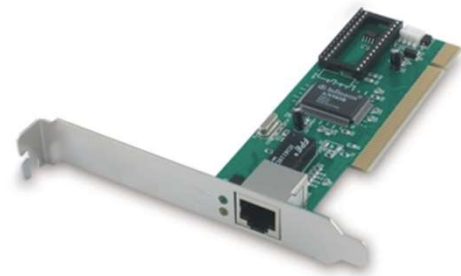


NETWORK HARDWARE

Chapter3

NETWORK HARDWARE

- Network Interface Card (NIC)
 - to allow a device to connect to a network
 - It contains the Media Access Control (MAC) address generated at the manufacturing stage
- Media Access Control (MAC Address)
 - It is physical address (cannot be changed)
 - It consists of 12 hexadecimal digits
 - 6 firsts digits represent a manufacturer
 - 7th -12th digit represent serial number
 - This is used to identify a computer in a network
 - it can be used as a whitelist of blacklist



INTERNET PROTOCOL (IP)

- Internet Protocol (IP) address
 - The addressing system to identify individual computers/servers on the network
 - It is assigned by ISP (Public IP), and it is assigned by router (Private IP)
 - There are two versions of IP, IPv4 and IPv6
- IPv4
 - Four sets of decimal number, each set have value between 0-255
 - $2^8 \cdot 2^8 \cdot 2^8 \cdot 2^8$ 32 bits
 - E.g. 192.168.1.1
 - Run out on IP
- IPv6
 - Eight sets of hexadecimal, each set have four bits of hexadecimal
 - $2^{16} \cdot 2^{16} \cdot 2^{16} \cdot 2^{16} \cdot 2^{16} \cdot 2^{16} \cdot 2^{16} \cdot 2^{16}$ 128 bits
 - E.g. – fd2a:1450:4013:c01:0:0:0:5e

IP ADDRESS AND MAC ADDRESS

MAC addresses	IP addresses
identifies the physical address of a device on the network	identifies the global address on the internet
unique for device on the network	may not necessarily be unique
assigned by the manufacturer of the device and is part of the NIC	dynamic IP addresses are assigned by ISP using DHCP each time the device connects to the internet (see later)
they can be universal or local	dynamic IP addresses change every time a device connects to the internet; static IP addresses don't change
when a packet of data is sent and received, the MAC address is used to identify the sender's and recipient's devices	used in routing operations as they specifically identify where the device is connected to the internet
use 48 bits	use either 32 bits (IPv4) or 128 bits (IPv6)
can be UAA or LAA	can be static or dynamic

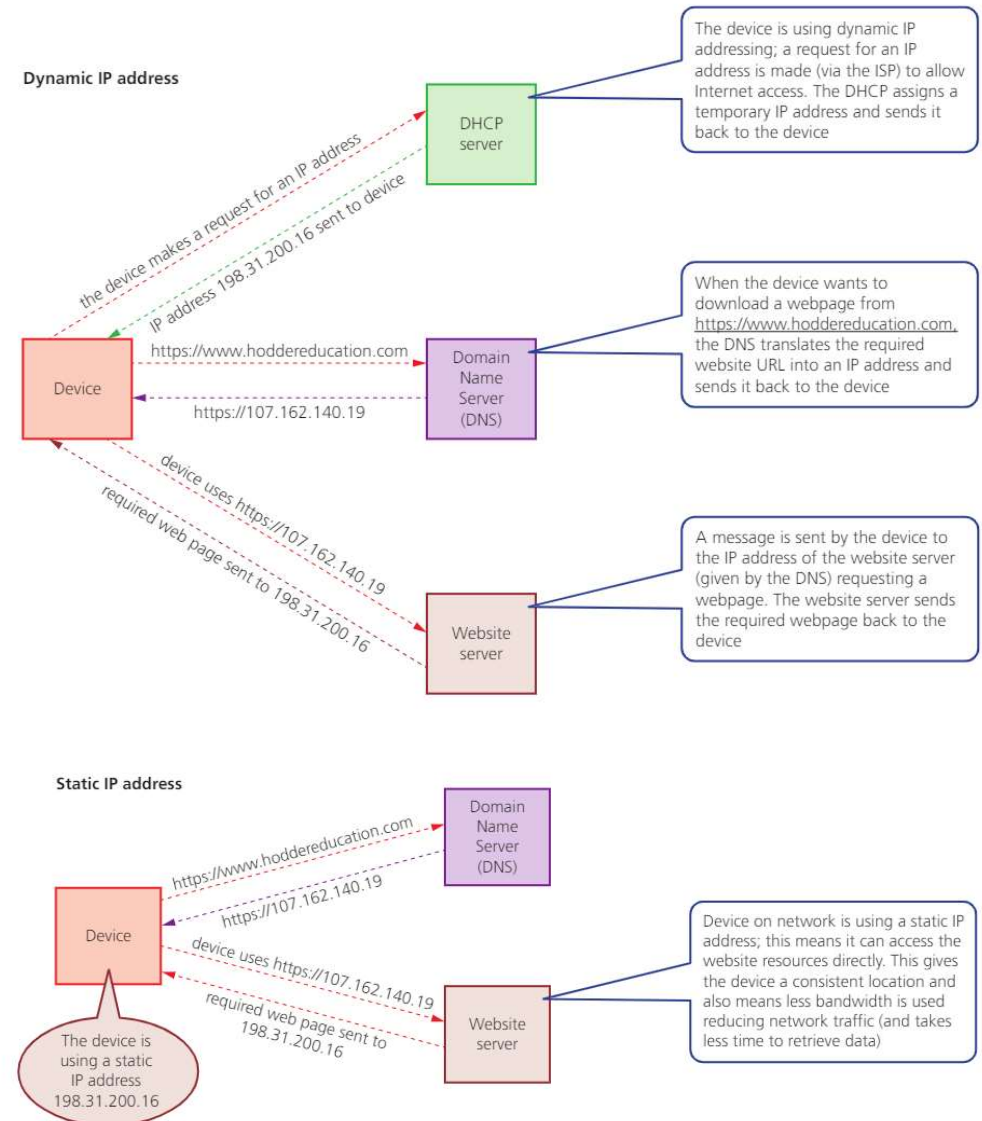
INTERNET PROTOCOL (IP)

• Dynamic IP

- Dynamic IP addresses are assigned by the ISP each time a device logs onto the internet
- This is done using Dynamic Host Configuration Protocol (DHCP)

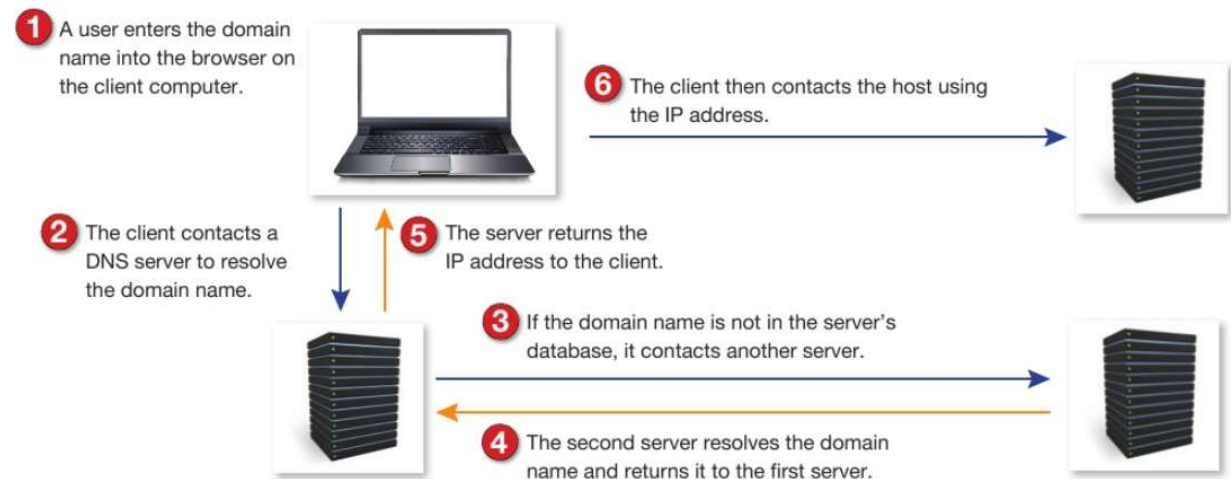
• Static IP

- Static IP addresses are permanently assigned to a device by the internet service provider (ISP)
- They don't change each time a device logs onto the internet
- usually assigned to remote servers which are hosting a website or an online database



DOMAIN NAME SERVICE

- Domain names
 - This is part of the URL for a resource on the internet
 - Domain name will be converted to the correct IP address by DNS
- Domain Name Service (DNS)
 - Humans use URL because it is easy to remember
 - But computers in a network using IP address for identifying each computer
 - DNS convert domain name to correct IP address



▲ Figure 5.8 Domain name service (DNS)

NETWORK HARDWARE

- Router
 - A piece of networking hardware used to forward packets of data from one network to another
 - For example, to join a LAN to a WAN. The router takes data transmitted in one format from a network (which is using a particular protocol) and converts the data to a protocol and format understood by another network

