Unit 1: Basic Computer Networking

By Cube Training

Introduction to Network

What is network?

A network is two devices connected to each other with a physical medium, such as wires or radio signals.

This connection allows these devices to exchange data.

Why do you require network?

Network can enhance many aspects of your business and day to day life.

Introduction to Network

Networking allows you to:

- Collaborate and communicate
- Share information and resources
- Reduce the overall cost of running your business
- And many more …….

Introduction to Network

What is LAN (Local Area Network)?

A group computers and associated devices sharing data by using a common wired or wireless path.

What is WAN (Wide Area Network)?

Wide Area Network is a network that extends to a greater distance. Wide Area Network can be defined as number of Local Area Networks connected via a common medium such as Internet.

What devices make up LAN?

There are many devices make up a LAN. This includes softwares and hardwares.

These hardware components include **cable**, **Hub**, **Switch**, **NIC** (network interface card), **modem**, **router**, storage and many more.

What devices make up LAN?

Network Interface Card

Network adapter is a device that enables a computer to talk with other computer/network. Using unique **hardware addresses (MAC address)** encoded on the card chip, the data-link protocol employs these addresses to discover other systems on the network so that it can transfer data to the right destination.

There are two types of NIC.

What devices make up LAN?

There are two types of NIC.

Wired and wireless

The NIC comes with different speed. It is normally measured as bits per second (bps).

What devices make up LAN?

Hub

Hub is more like a distribution center. When a computer sends data to another, it is sent to a hub. Hub will distributes that data to all other computers on that network. The correct destination will pick that data.

Hubs are becoming obsolete and replaced by switches and routers.

What devices make up LAN?

Switch

A switch is very much like hub, but it uses physical device addresses to deliver the data to the correct destination. Unlike hub, switch will not broadcast the data to the entire network. It will identify the correct port or system before the data is sent.

This is reduce the transmission time and increase the effectiveness of data transmission.

What devices make up LAN?

Cables and connectors

In data transmission different types of cables are used.

- Twisted pair wire (CAT5, CAT6 & CAT7)
- Coaxial cable (RG59, RG11)
- Fibre optics

What devices make up LAN?

Router

A router allows a local area network to be connected to internet.

In a domestic property you will a router is connected to a wall socket and all other devices are connected to that router.

In modern days, routers come with inbuilt switch.
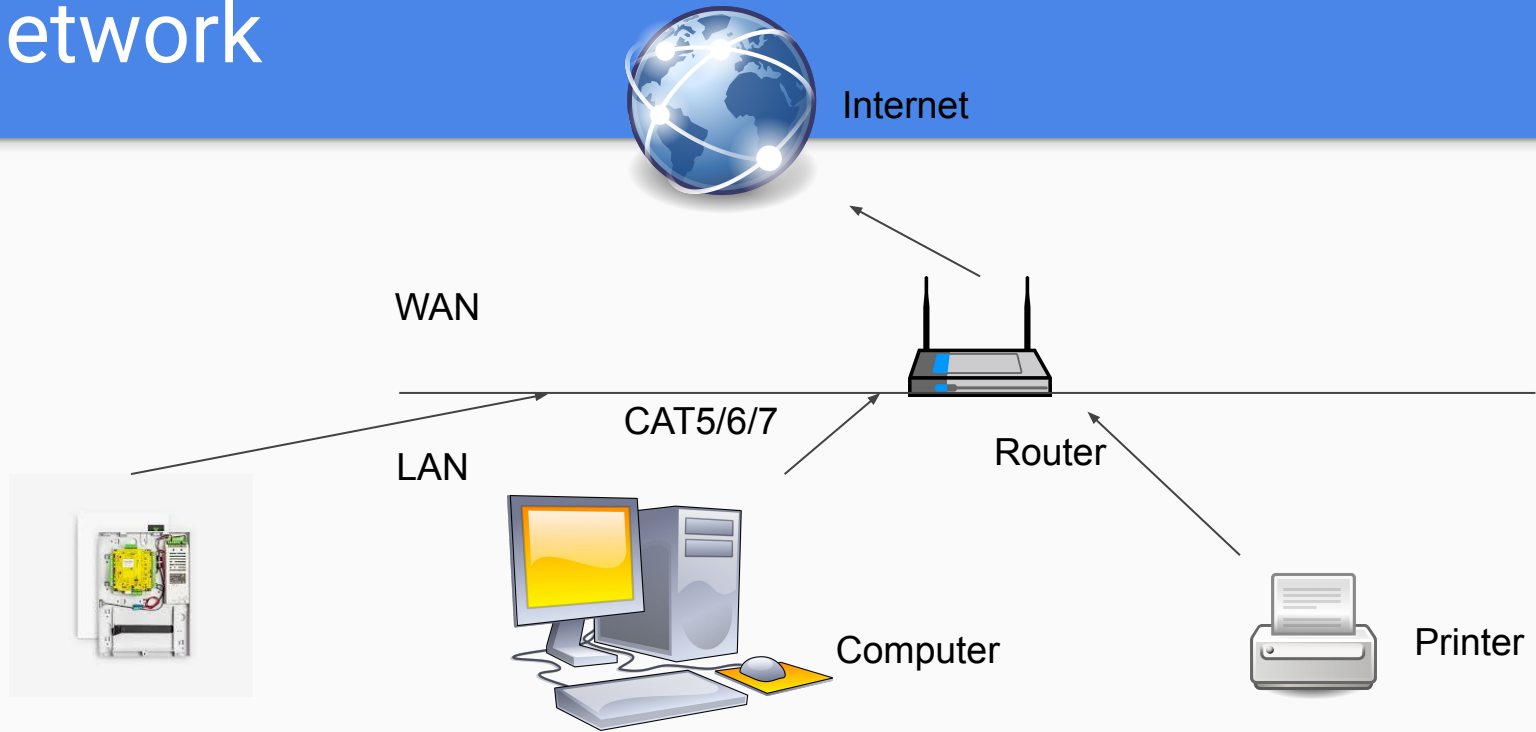
What devices make up LAN?

Modems

Modem is required when connecting to internet via telephone line (DSL).
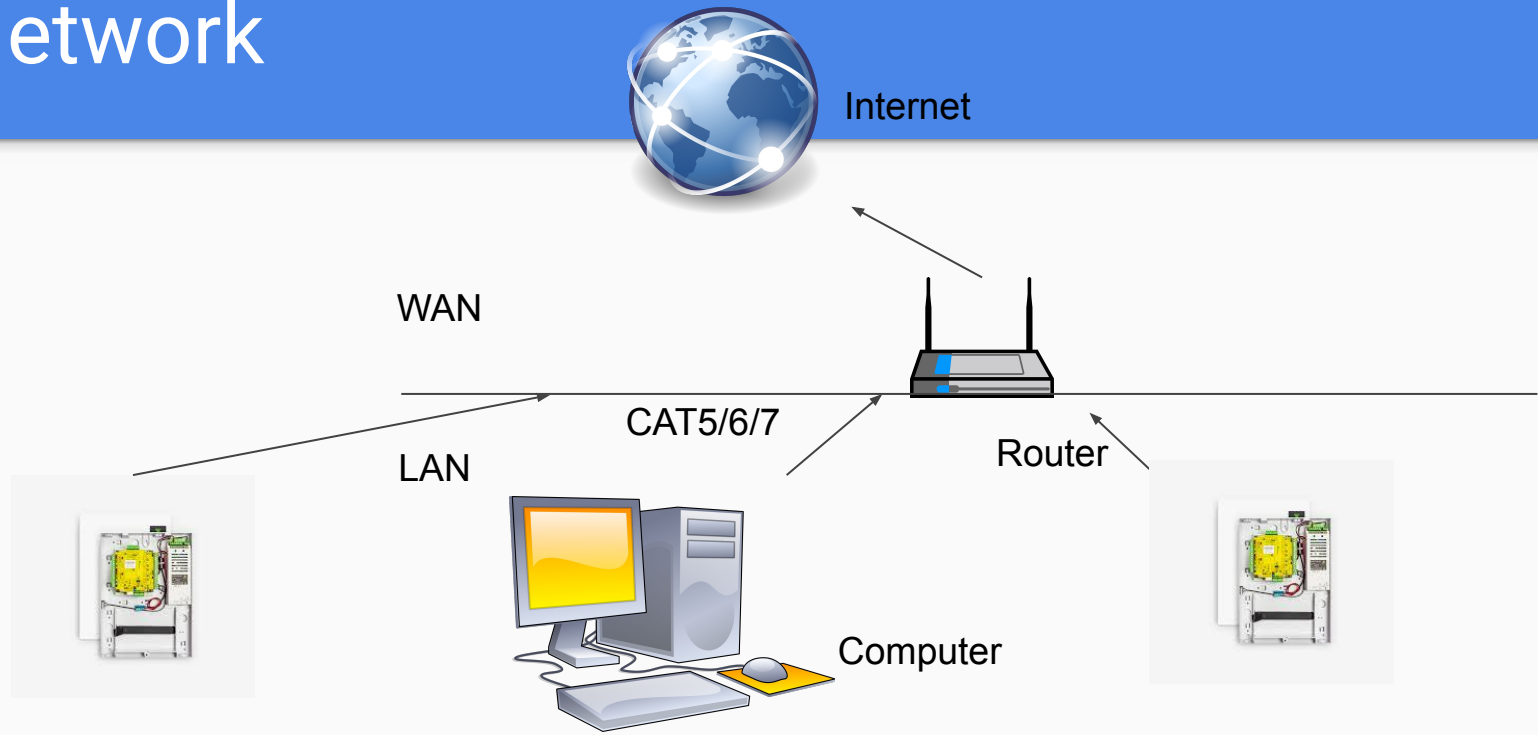
Modem convert digital to analogue and analogue to digital.

It is not required in LAN, if you an ADSL router, you can plug it to your telephone line and no modem required.

Network

Internet

WAN

CAT5/6/7

LAN

Router

Computer

Printer

Network

Internet

WAN

CAT5/6/7

LAN

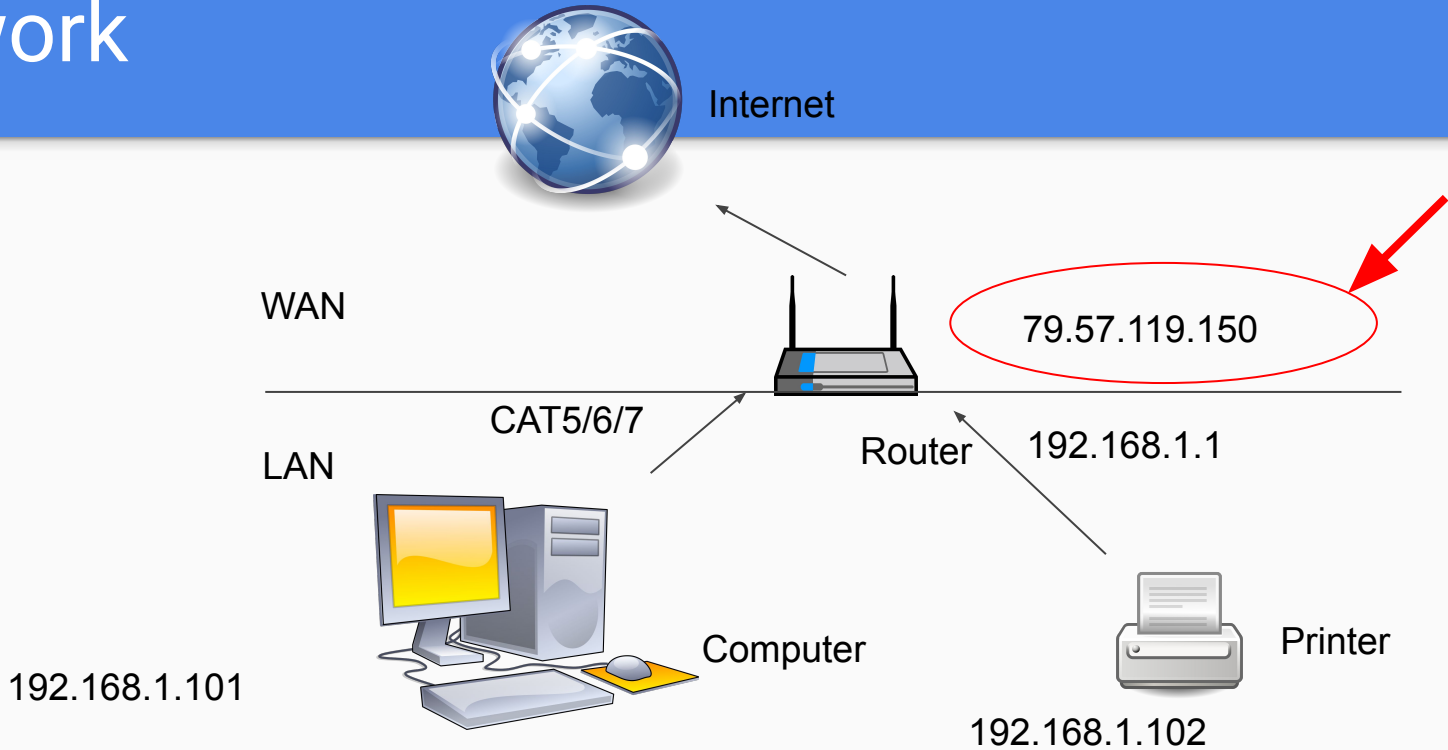Router

Computer

Network

Internet

Network - IP address

IP address (Internet Protocol Address)

IP address can be compared with your postal address. In a network, if you want to send data to another device, you should know the IP address of that device. IP address is the individual identification of every devices in a network.

Network

Internet

WAN

79.57.119.150

CAT5/6/7

LAN

Router

192.168.1.1

Computer

Printer

192.168.1.101

192.168.1.102

How TCP/IP works

TCP/IP for IP version 4 (IPv4) is a networking protocol used to communicate over the internet with other computers. IPv4 is the fourth version of Internet Protocol. The IPv4 uses 32 bit addressing technique and addresses are limited to 2^{32}

IP address (IPv4)

An IP address in version 4, looks like.

192.168.1.16

There are four set of numbers or four 4 bytes

11000000   10101000   00000001   00010000

8 bits   8 bits   8 bits   8 bits

1 byte   1 byte   1 byte   1 byte

IP address (IPv4)

IP address is a unique identification for computers and other associated networkable devices in a LAN or WAN. In order for a device to be a part of a network, it should have an IP address.
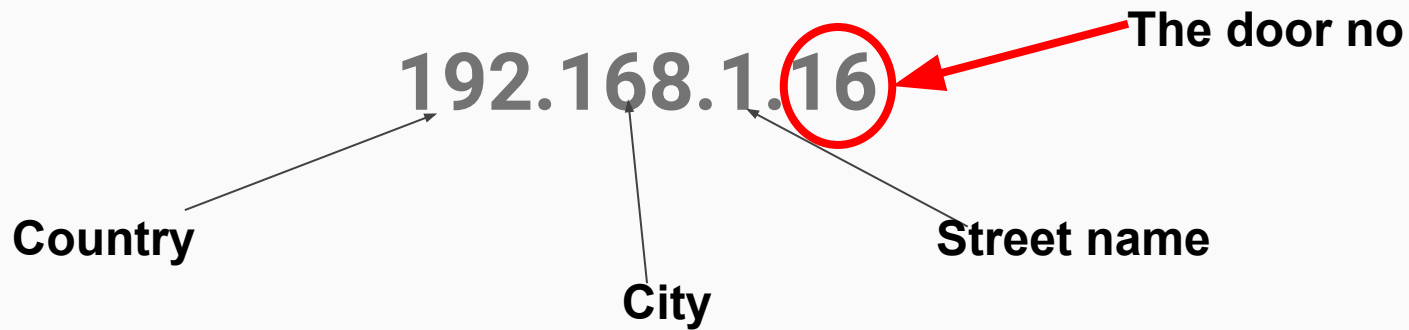
IP address can be compared with postal addresses.

For example, you and your neighbour's address will have same street name, city and country.
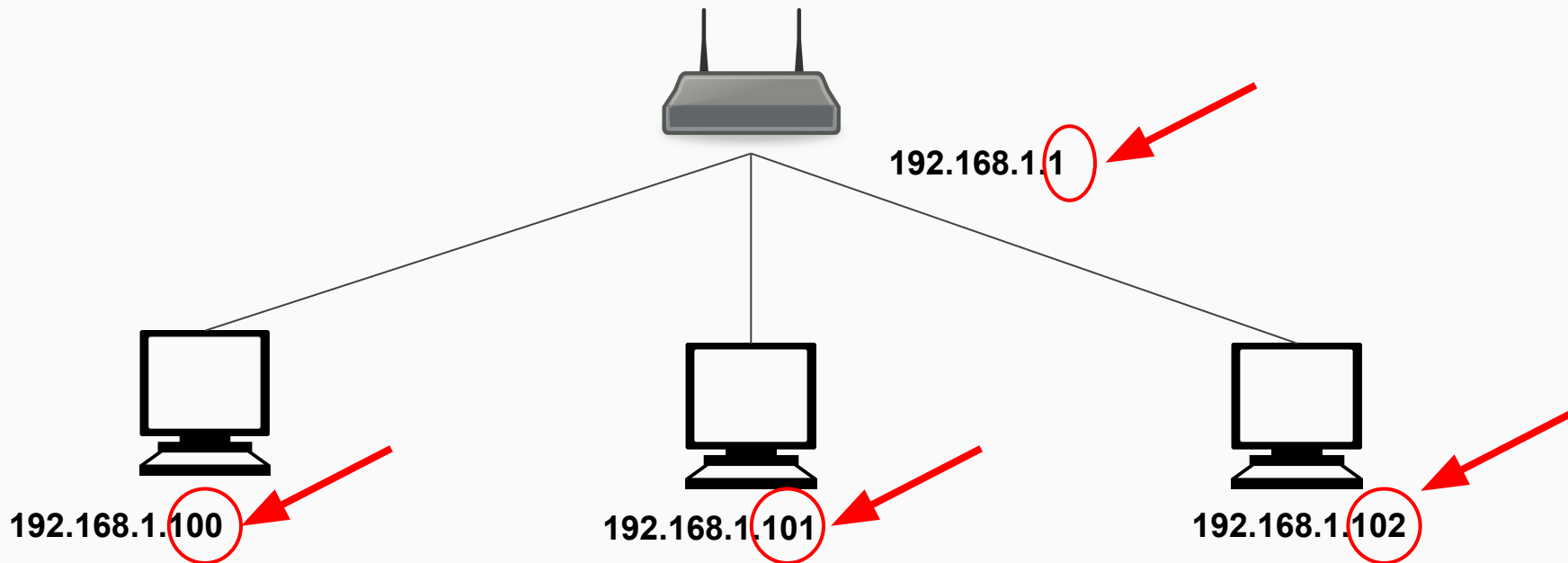
The only difference would your door number.

Let's see an IP address.

IP address (IPv4)

192.168.1.16

Country

City

Street name

The door no

IP address (IPv4)

192.168.1.1

192.168.1.100

192.168.1.101

192.168.1.102

Exercise 1 - Find the IP address of the CCTV camera.

???.???.???.103

192.168.1.1

192.168.1.100

192.168.1.101

192.168.1.102
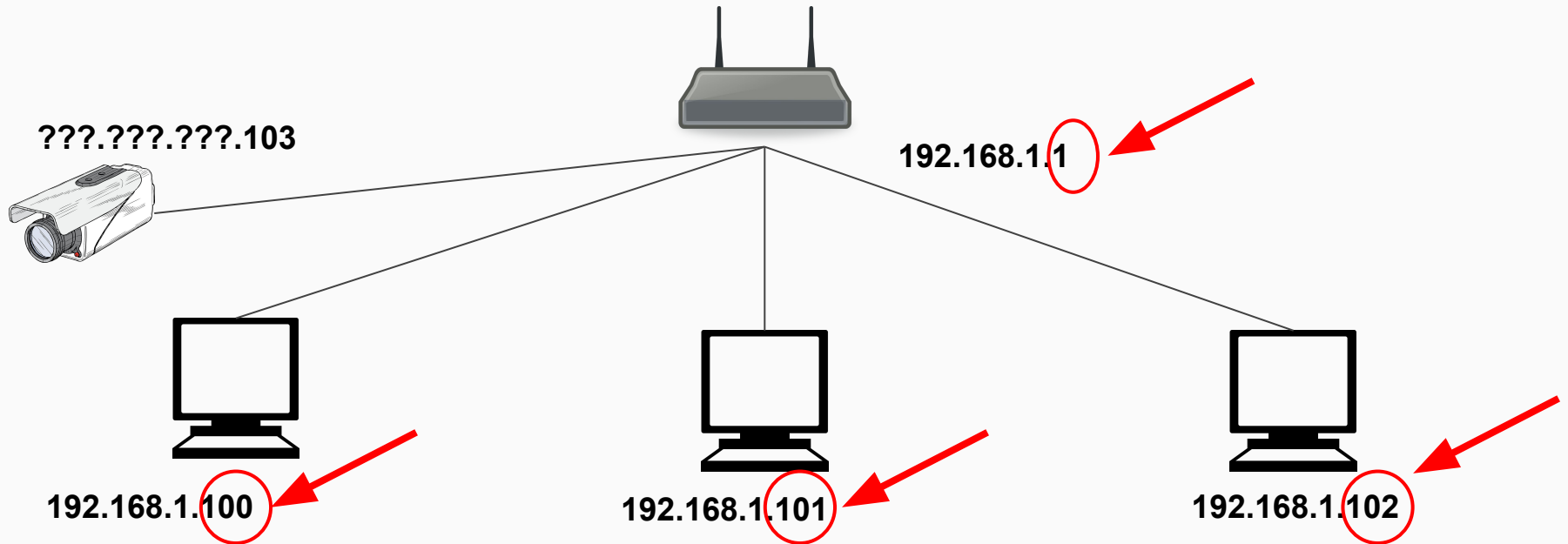
Quiz 1

1. A home router
   a. Makes home computers run faster
   b. Enables safe sharing of resources among network devices in the home
   c. Helps people build websites
   d. Helps people to stream movies online

2. A home computer network is some time known as
   a. WAN
   b. MAN
   c. SAN
   d. LAN

Quiz 1

3. IP camera is

    a.   A computer

    b.   A laptop

    c.   A camera that uses IP to send data

    d.   A bullet camera

Why local (private) IP addresses change?

There are three network classes, class A, class B and class C. Class A is mostly used in huge networks, for example places where many computers and other accessories are used. It has 24 host bits, which can be used for networking. It is capable of providing 2 power of 24 IP addresses.

Class B uses 16 host bits and it is capable of providing 2 power of 16 IP addresses.

And class C is the most common type used in small places. It is capable of providing 2 power of 8 IP addresses.

Why local (private) IP addresses change?

Class	Value for w	Network ID Portion	Host ID Portion	Network IDs	Host IDs per Network
A	1-126	w	x.y.z	126	16,777,214
B	128-191	w.x	y.z	16,384	65,534
C	192-223	w.x.y	z	2,097,152	254