

# JOB ROLE – Domestic Biometric Data Operator

Sector – Information Technology and Information Technology  
enabled Services  
(Qualification Pack Code: SSC/Q2213)



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**UNIT 4. COMPUTER NETWORKS,  
INTERNET AND STANDARDS OF BIO-  
METRIC DATA**

**SESSION 1. COMPUTER NETWORKS**

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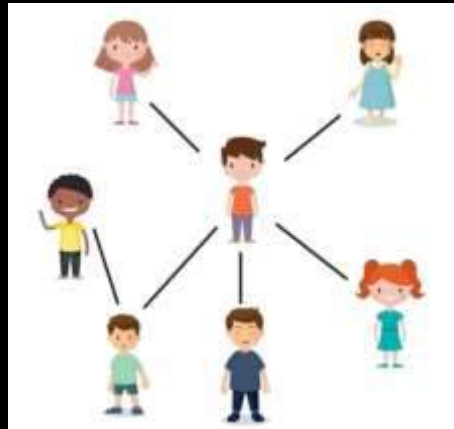
# Session Objectives

The students will be able to:

- Introduction to Need and importance of networking in Biometric System
- Discuss Network Processing Loads
- Explain Computer network
- Classify Types of Network
- Describe Networking Models
- Explain Networks Devices
- Define Network Protocol
- Discuss Wireless Networking
- Draw Internal Structure of Biometric Attendance System (BAS)
- Perform Testing of BAS using Ping command

# Introduction

The word networking is used to describe a variety of issues such as social networking, community networking, etc. As you talk to different people in your area, around the world discussing common issues, you are in a network. It is a network of people talking to each other. When the computers in a network are connected to the Internet, then all the computers of this network can communicate with the other computers connected to the Internet across the globe.



# Need and importance of networking in Biometric System

The biometric attendance system is commonly used in every organisation to record the attendance of employees. We have seen that the biometric attendance system normally works on wireless network

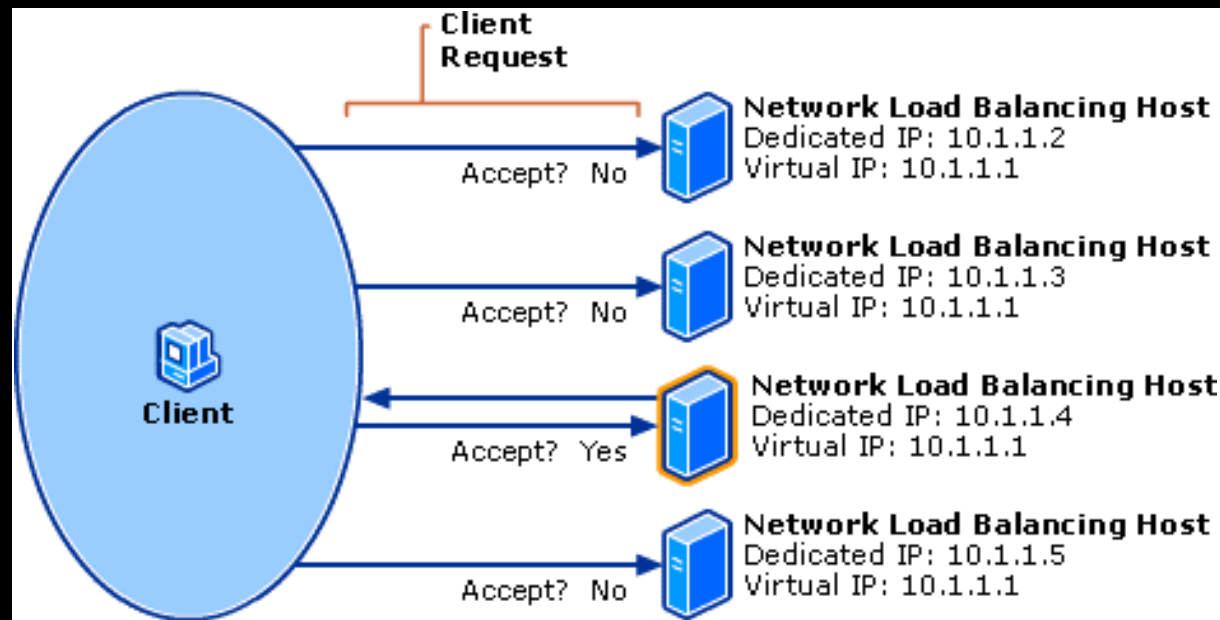
Biometric System Architecture allows to use networking. This is quite useful in large scale Biometrics implementation. There could be a combination of Biometric modalities to be used with another. It is possible to network these Biometric modalities. All these are networked together and connected to a central server. In some application it may require utmost security.

The Biometric Systems consist of many devices interlinked together due to which biometric devices can communicate with each other and can share the biometric templates within few seconds.

# Network Processing Loads

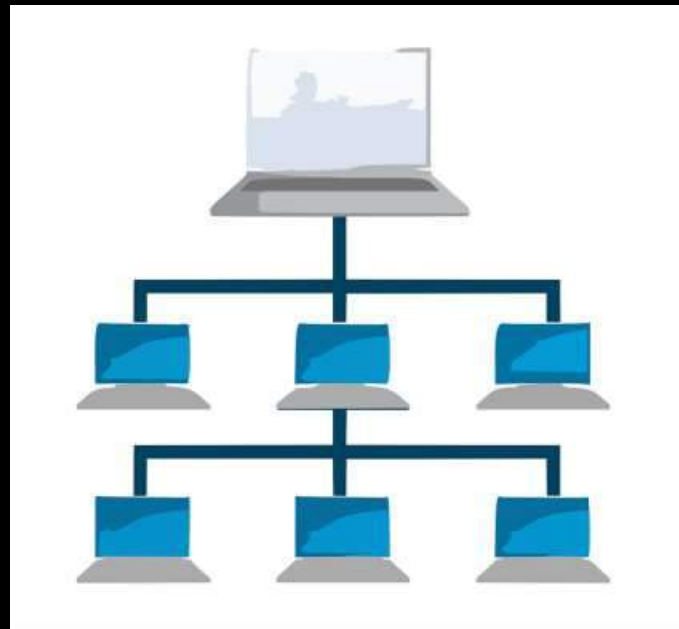
This is the concept of properly balancing the network load. It ensures the workload of all the devices connected to network is proportionately equal to avoid the delays.

When the Biometric Devices are all connected with one another, the Transaction Processing Load for the verification and identification based applications can be shared with distributed network resources.



# Computer network

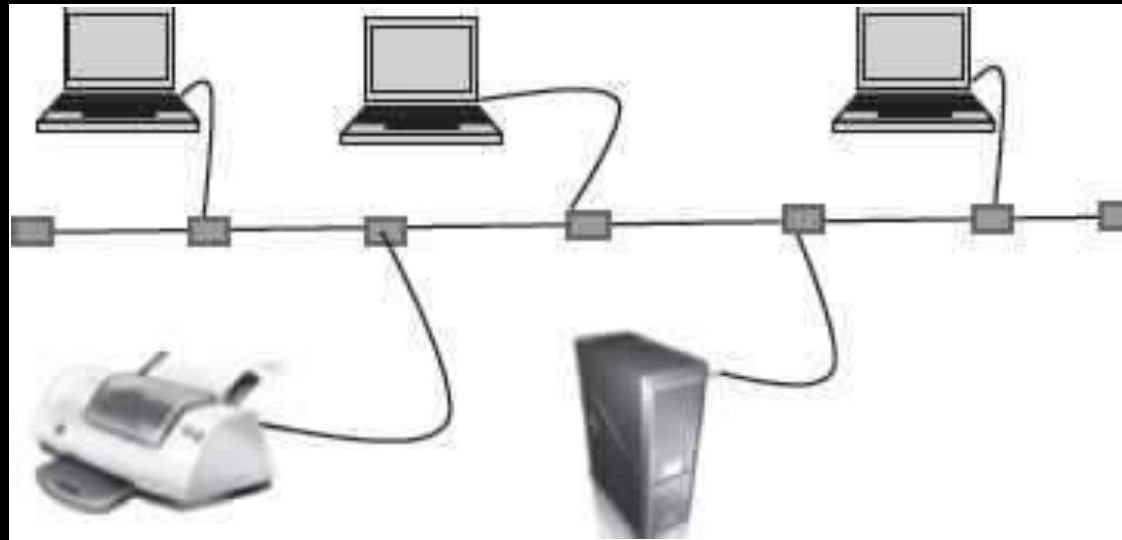
A computer network consist of computers, printers, scanners and other hardware interconnected by communication channels. The network is used for sharing of resources such as printer, scanner or storage devices and services such as mail and web services. The computers on a network may be linked through cables or wirelessly. Figure 4.2 shows a simple computer network.





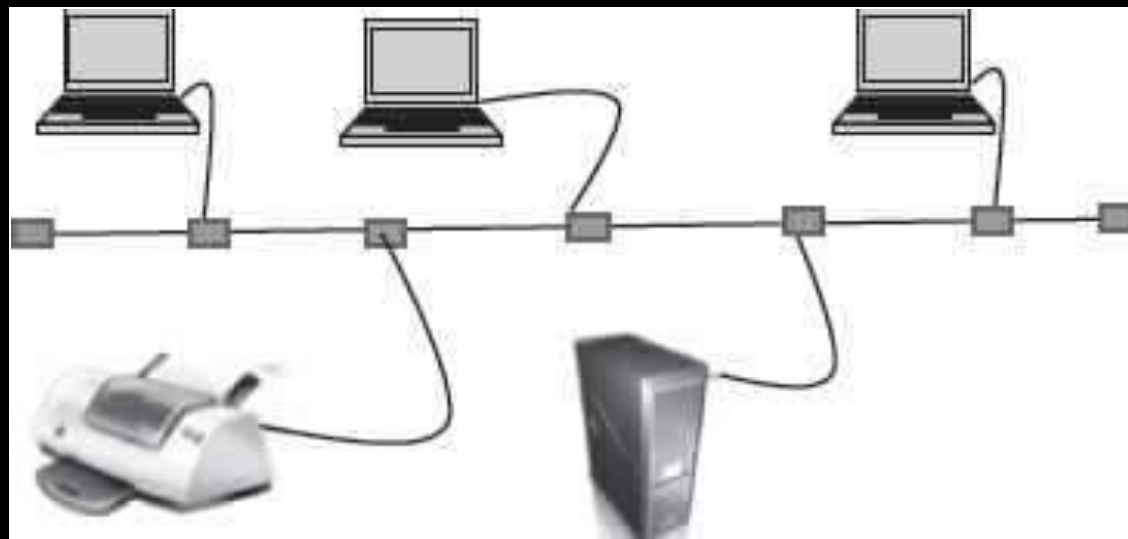
# Types of Network

**1. LAN (Local Area Network):** Most of the organizations create a simple network of computers within the building or campus by connecting computers and peripherals to serve the purpose of sharing computing infrastructure within the organisation. This type of network is called as local area networks (LANs).



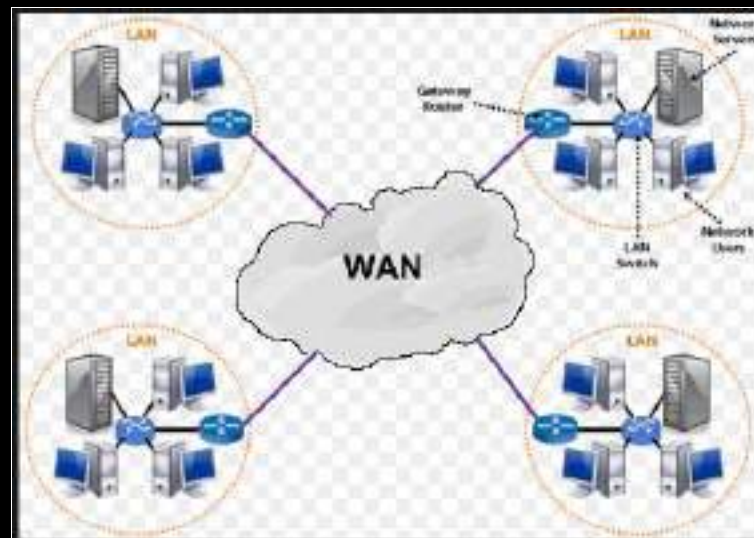
# Types of Network

**2. Wide Area Network (WAN):** When an organization needed to provide a network in different locations across large geographical areas then WAN is created. WAN connect LAN's between different locations. For example, computers or devices in a branch office could connect to the computer networks at the head office through telephone lines or satellites. WANs are also used in biometric systems to communicate with the remote server as in the case of Aadhaar, biometric data is saved and retrieved from server through biometric device.



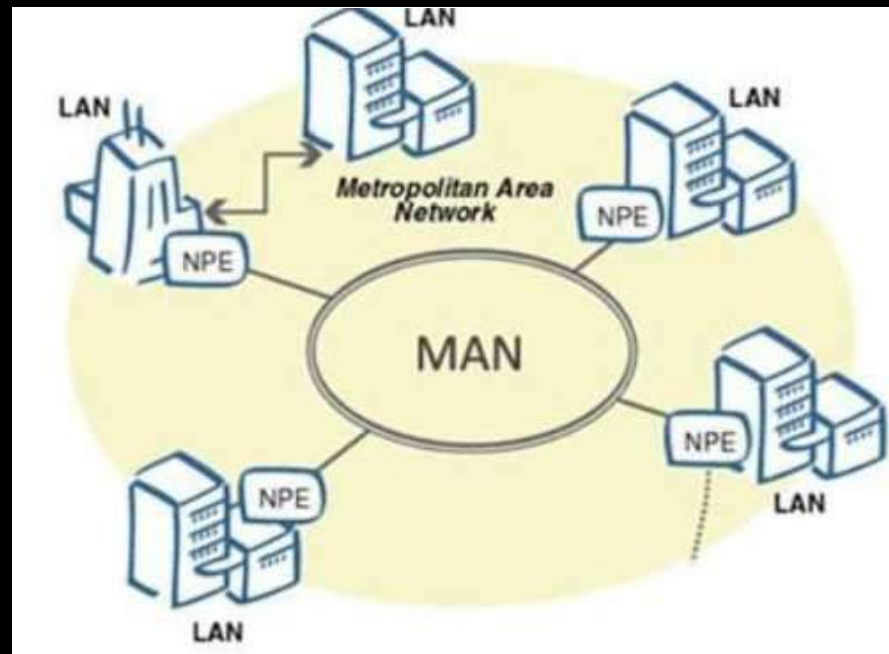
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# Types of Network

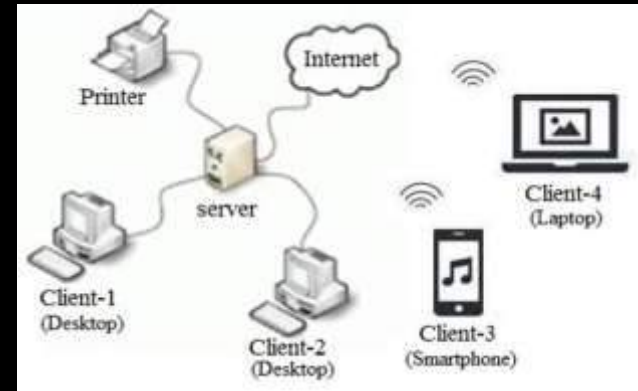
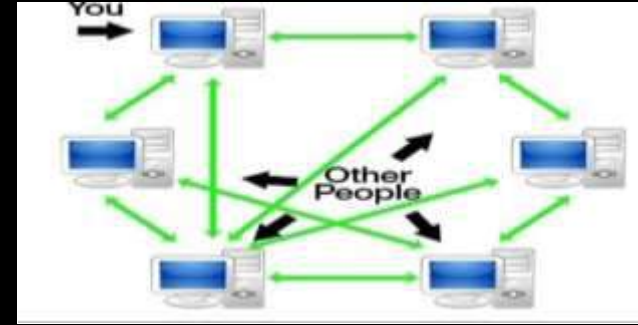
**3. Metropolitan Area Network (MAN):** A MAN is a network that connects two or more LAN or Campus Area Network (CAN) together but does not extend beyond the boundaries of metropolitan area. Multiple routers, switches and hubs are connected to create a MAN.



# Networking Models

**Peer-to-Peer (P2P) Model:** In a Peer to Peer Biometric Network, the Clients are all networked to one another without having the need of main Hosts. The computers communicate with each other by using a protocol. The clients (Biometric devices) known as “Peers.”

**Client / Server Model:** Client/server network consists of one central server and several client computers connected to the server. In Client/Server networking of Biometric system all Biometric devices are interlinked with another and the overall system is connected to a Central Server.



# Networks Devices

The physical devices called as nodes, which helps computer to communicate to each other are called network devices. These devices are used for connecting two different network models. In a network, the devices which receive or generate data are called hosts and the intermediate devices are called nodes. There are different types of networking devices, which are listed as follows

- Network Interface Card (NIC)
- Repeaters
- Network Bridge
- Network Hubs
- Network Switches
- Routers
- Network Gateways
- Modem
- Access Point
- WIFI Router

# Network Protocol

Protocols are a set of rules or standards that allow network devices to communicate and exchange information. The Biometric devices connected in network also have to use network protocols to transmit the information through data packets. Examples of protocols at the network layer are NetBEUI, IPX/SPX, TCP/IP, AppleTalk.

**TCP/IP (Transmission Control Protocol / Internet Protocol):** TCP/IP is a combination of two protocols. TCP stands for the Transmission Control Protocol, and IP stands for Internet Protocol. Biometric System most commonly use TCP/IP protocol. It is the most widely used protocols for data transfer over Internet. TCP offers connection-based services.

# Network Protocol

**IP Address:** Every computing device such as computer, tablet, smartphone, that communicates on the Internet, is assigned a unique identifying number called an IP (Internet Protocol) address. Currently there are two standards of IP-address – IPv4 and IPv6. IPv4 (version 4), has the format of four numbers between 0 and 255 separated by a period. These IP addresses are assigned by an Internet Service Provider (ISP). The ISP charges a fee for the service. Example of IP address are:

172.64.85.42



# Classful Network

Classful network is an addressing schedule originally introduced in 1981 and used for several years until the introduction of Classless Inter-Domain Routing (CIDR) method. In this method, the 32-bit address space is divided into five addresses classes namely A, B, C, D and E. Each class defines a fixed network size and number of hosts within networks.

Following table summarizes the classes of IPv4 addressing:

Class	Range	Subnet	No. of Networks	No. of Hosts/ N
A	0.0.0.0 – 126.255.255.255	255.0.0.0	126	16777214
B	128.0.0.0 – 191.255.255.255	255.255.0.0	16384	65532
C	192.0.0.0-223.255.255.255	255.255.255.0	2097152	254
D	224.0.0.0 – 239.255.255.255	Multicast		
E	240.0.0.0 – 255.255.255.255	Reserved for future use		

# Wireless Networking

Wireless networking is the wireless technology to establish a wire-free connection or communication between two or more devices. In wired technology data is encoded as electric current and signals travel through wires, while in wireless technology data is encoded on electromagnetic waves that travel through air. Today, we are using wireless communication in laptop, iPad, smartphones to access the Internet. The wireless technologies have made these devices more functional.

- **Wi-Fi** : Wi-Fi is a technology that takes an Internet signal and converts it into radio waves. These radio waves are picked up by wireless adapter. The devices in the radius of approximately 50-60 feet can catch the signal.
- **Mobile Network** : Mobile phone technologies have evolved different communication standards for their mobile phone networks. GSM used by AT&T and T-Mobile and CDMA used by the other major carriers.
- **Bluetooth** : Bluetooth technology is used to connect the different components wirelessly. Bluetooth has a range of approximately 300 feet and consumes very little power. The printer, wireless keyboard and mouse can be connected to computer through Bluetooth.

# Biometric Attendance System (BAS) in Network

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# **Internal Structure of Biometric Attendance System (BAS)**

- 1. The Biometric Attendance System (BAS) supports TCP/IP protocols for communication. It also supports Wi-Fi, GPRS & GPS.**
- 2. The BAS can be store 8000 to 10000 unique biometric fingerprints records & up to 100000 total transactions in their storage.**
- 3. BAS working over push data technology & also supports both static & dynamic IP address.**
- 4. Biometric attendance system having 800 MHz 32-bit Microprocessor.**

# Summary

In this session, you have learnt about the computer network, its model and protocol used in biometric system.

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