Lectures series in

CCNA Routing & Switching I

2nd Year 2nd Semister

By

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Network Media

The **function of the media is to carry a flow of information through a** LAN**.**

A. Wired Media:-   widely adopted *family* that uses copper and fiber media in local area network (LAN) technology are collectively known as Ethernet

    1. Copper Cable
        a. Coaxial Cables
        b. Shielded Twisted Pair(STP)
        c. Unshielded Twisted Pair

    2. Fibre Optic Cable

B. Wireless Media:- use the atmosphere, or space, as the medium.

1. Copper Cable

➢ The most common, easiest, quickest, and cheapest form of network media to install.
➢ The disadvantage of sending data over copper wire is that the further the signal travels, the weaker it becomes.

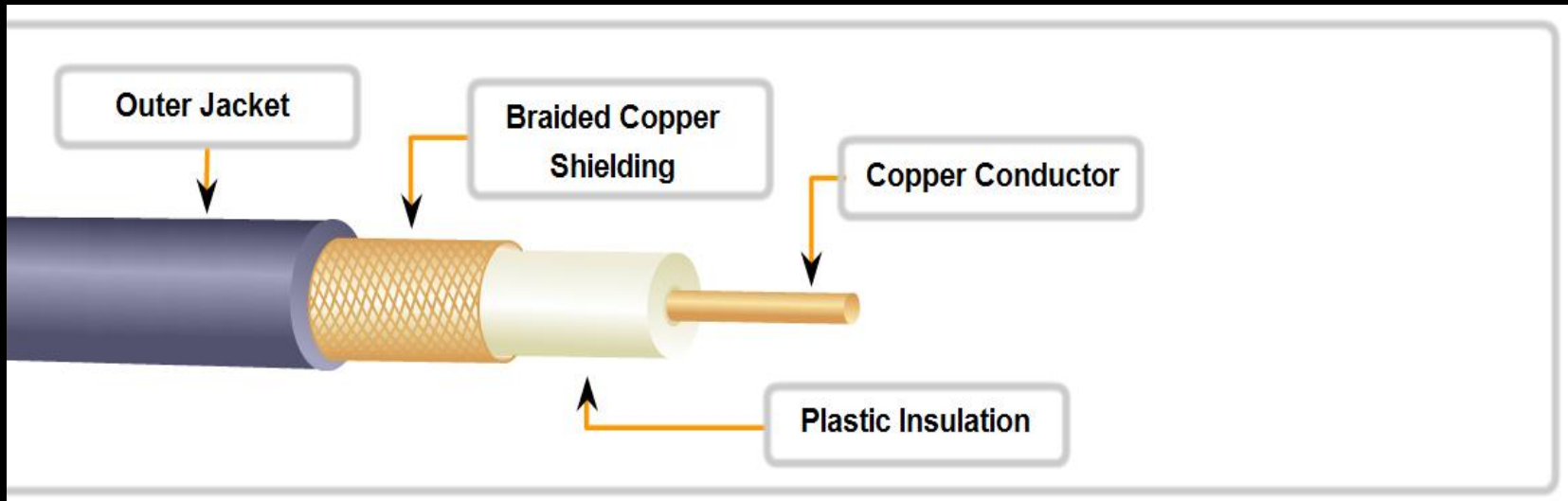10BASE5 - "Thicknet"

10BASE2 - "Thinnet"

10BASE-T

a. Coaxial Cable

➢ It can be run longer distances than Twisted pair Cables.

- Speed: 10-100Mbps
- Cost: Inexpensive
- Media and connector size: Medium
- Maximum cable length: 500m

b. Shielded Twisted Pair(STP)

- Speed: 0-100Mbps
- Cost: Moderate
- Media and connector size: Medium to large
- Maximum cable length: 100m

Jacket   Braided Shield   Foil Shield   Twisted Pairs
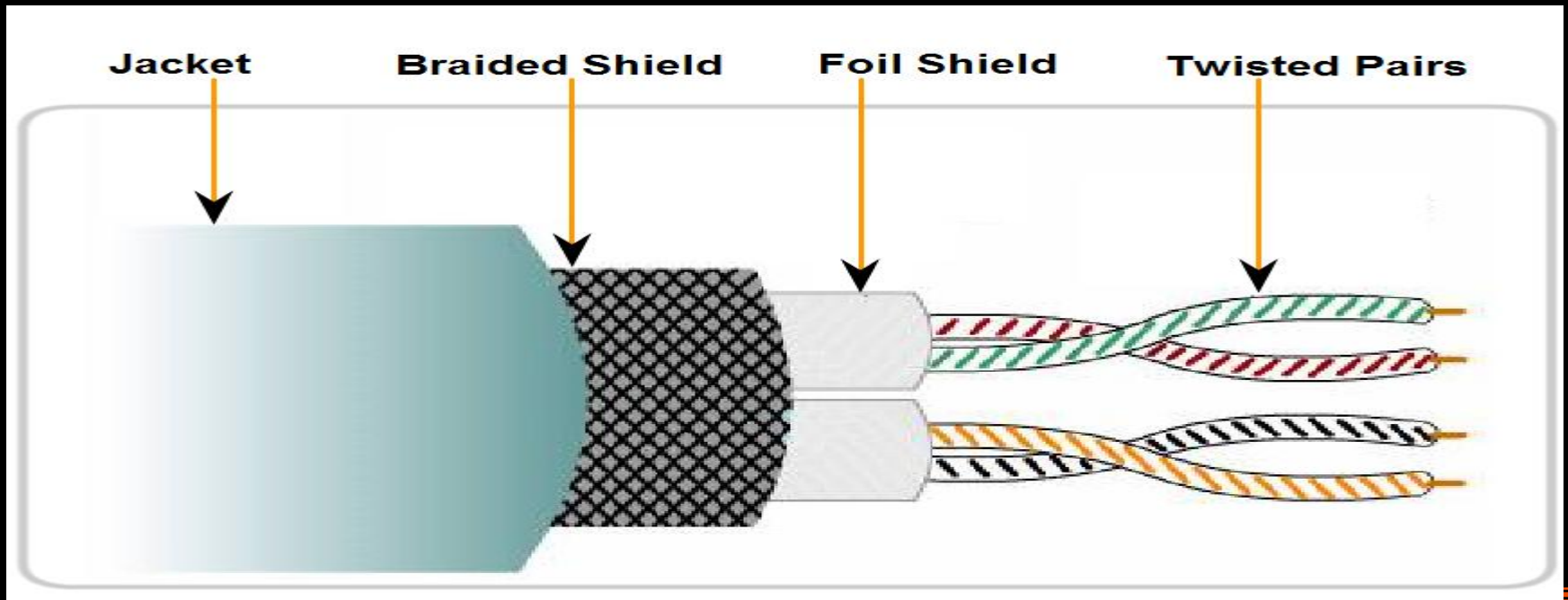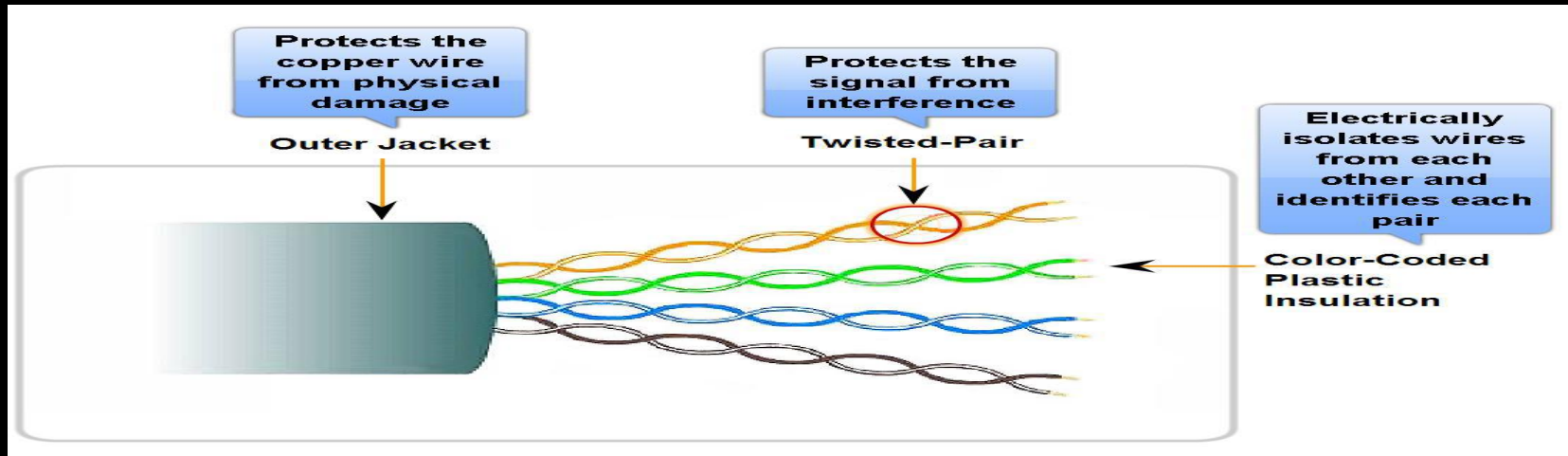
c. Unshielded Twisted Pair

➢ UTP is a four-pair wire medium used in a variety of networks.

➢ Each of the eight copper wires in the UTP cable is covered by insulating material

Speed: 10-100-1000 Mbps*
Cost: Least Expensive
Media and connector size: Small
Maximum cable length: 100m * (Depending on the quality/category of cable)

UTP Implementation

➢ EIA/TIA specifies an RJ-45 connector for UTP cable.

➢ The letters RJ stand for registered jack.

Fiber Optic Cable

➢ Glass fiber carrying light pulses, each pulse a bit.

➢ Based on the Total Internal Reflection of Light.

➢ High-speed point-to-point transmission 10-100's Gbps

➢ low error rate:

　➢ repeaters spaced far apart

　➢ immune to electromagnetic noise
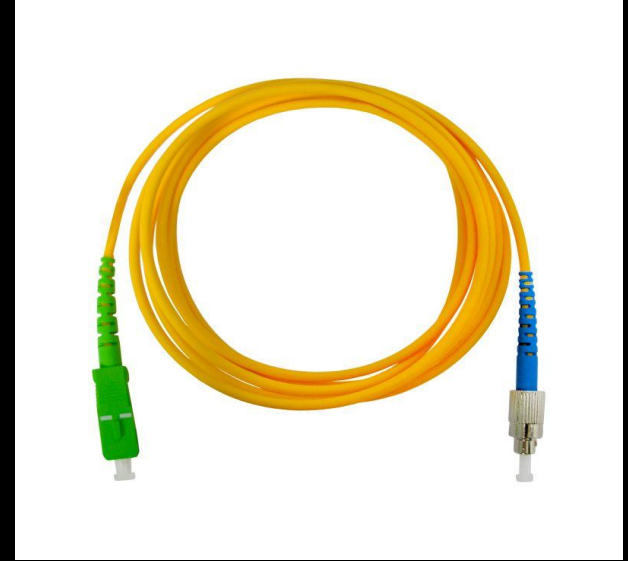
Communication Protocols

Internet Protocol Suite
- ➢ Also called TCP/IP, is the foundation of all modern networking.
- ➢ It defines the addressing, identification, and routing specifications for IPv4 and for IPv6.
- ➢ It is the defining set of protocols for the Internet.

IEEE 802
- ➢ It is a family of Institute of Electrical and Electronics Engineers (IEEE) standards dealing with local area networks and metropolitan area networks.
- ➢ They operate mostly at levels 1 and 2 of the OSI model.

Ethernet
- ➢ It is a family of protocols used in wired LANs, described by a set of standards together called IEEE 802.3

Communication Protocols

Wireless LAN
- ➢ It is standardized by <u>IEEE 802.11</u> and shares many properties with wired Ethernet.

SONET/SDH
- ➢ <u>Synchronous optical networking</u> (SONET) and Synchronous Digital Hierarchy (SDH) are standardized <u>multiplexing</u> protocols that transfer multiple digital bit streams over optical Fibre using lasers.

Asynchronous Transfer Mode(ATM)
- ➢ It uses asynchronous <u>time-division multiplexing</u> and encodes data into small, fixed-sized <u>cells</u>.
- ➢ Good choice for a network that handle both traditional high-throughput data traffic, and real-time, <u>low-latency</u> content such as voice and video.

Types of Networks

1. Personal Area Network (PAN)
2. Local Area Network (LAN)
3. Campus Area Network (CAN)
4. Metropolitan Area Network (MAN)
5. Wide Area Network (WAN)
6. Storage-Area Network (SAN)
7. Virtual Private Network (VPN)
8. Client Server Network
9. Peer to Peer Network (P2P)
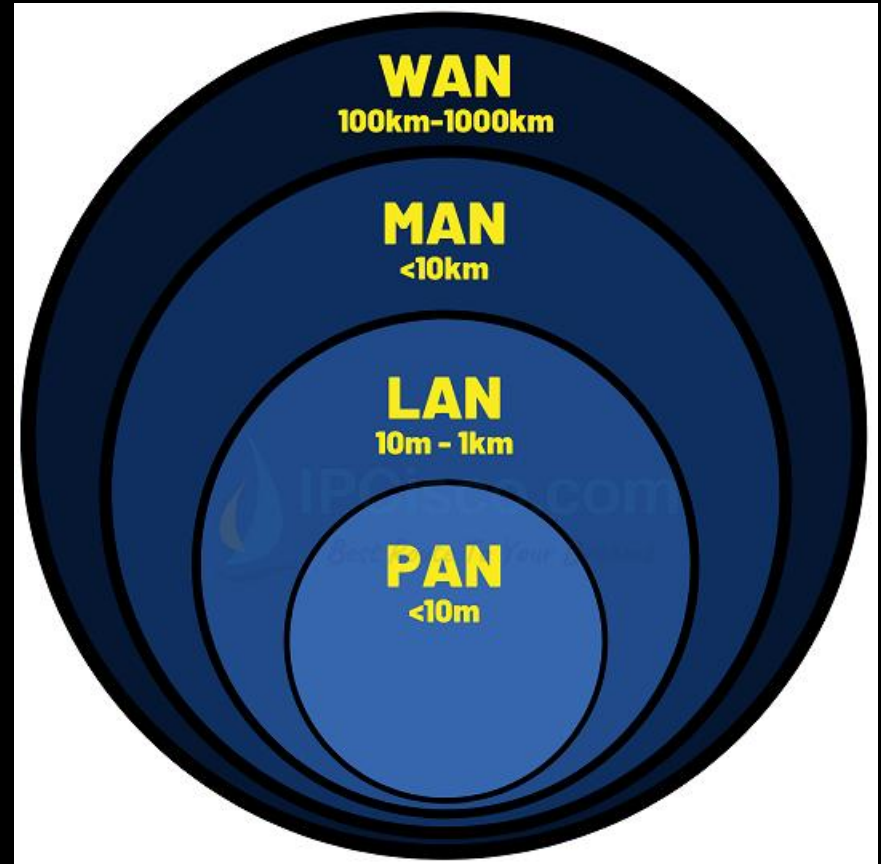
1. Personal Area Network

1. **Also Known as HAN (Home Area Network)**
2. The smallest network type is PAN (Personal Area Network). A PAN is the network around a single person. It consists of smart phones, laptops, tablets, wearable technology or any other personal digital device.
3. wIreless personal area network (WPAN) is a PAN carried over a low-powered, short-distance wireless network technology such as Wireless USB and Bluetooth.


Personal Area Network (PAN)
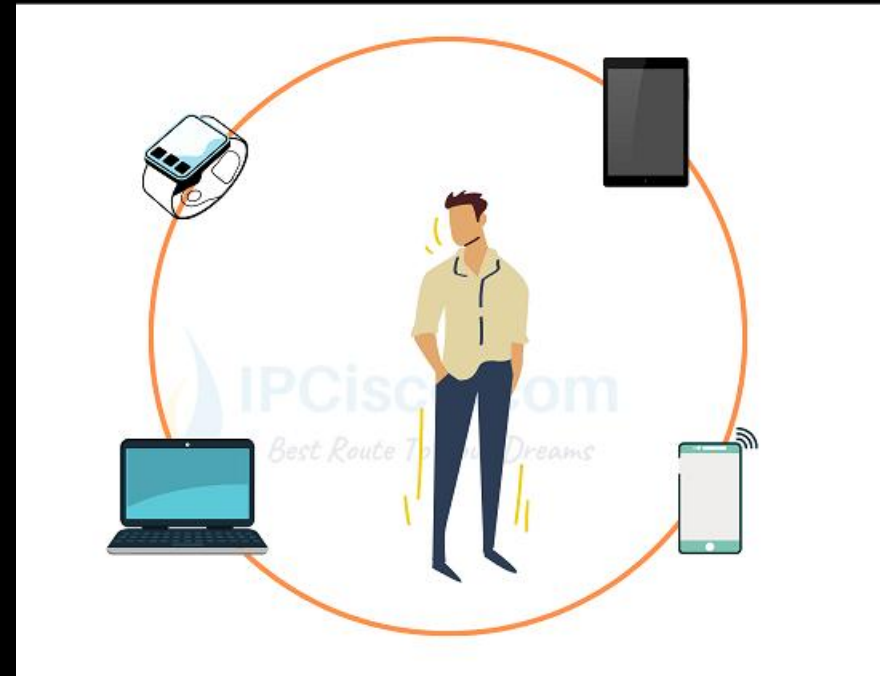
2. Local Area Network

➤ LAN (Local Area Network) is a small type of network used in houses, companies, schools or any other small areas.

➤ it used to share internet connection in any place. For example, the network in your company which you share information or communicate with your colleagues is a LAN.

➤ LANs covers mainly a building or a site. So, it has a distance limitation. With these characteristics, it is smaller than MAN and WAN. In LANs, both copper and fiber optic cables can be used. LANs are fast networks. There are differen LAN topology types.
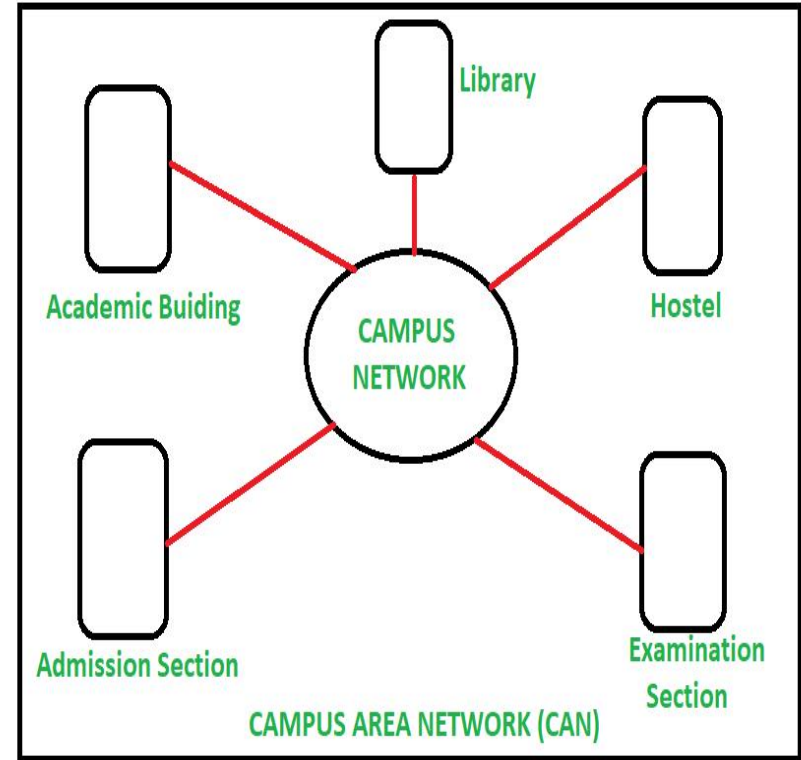
Local Area Network (LAN)
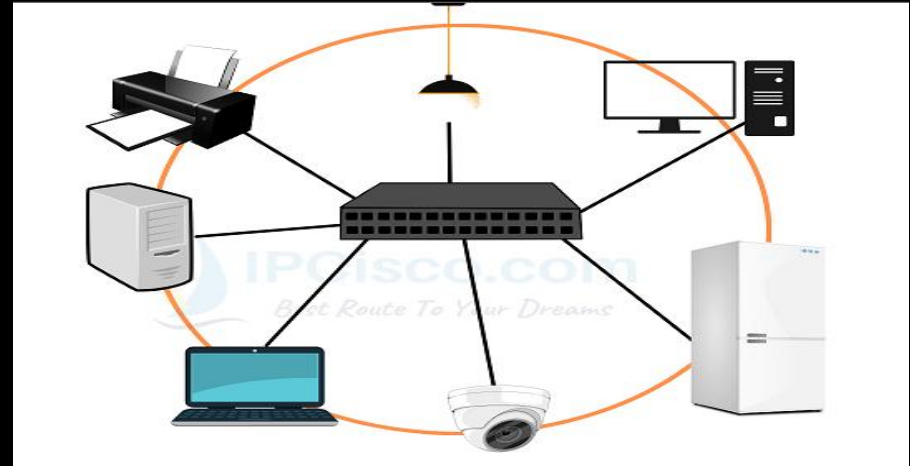
➤ WLANs are the wireless LANs, which covers a small area to provide a wireless connection to laptops, smartphones or any network devices. It is used by wireless capable devices and provide a small network in a limited area.
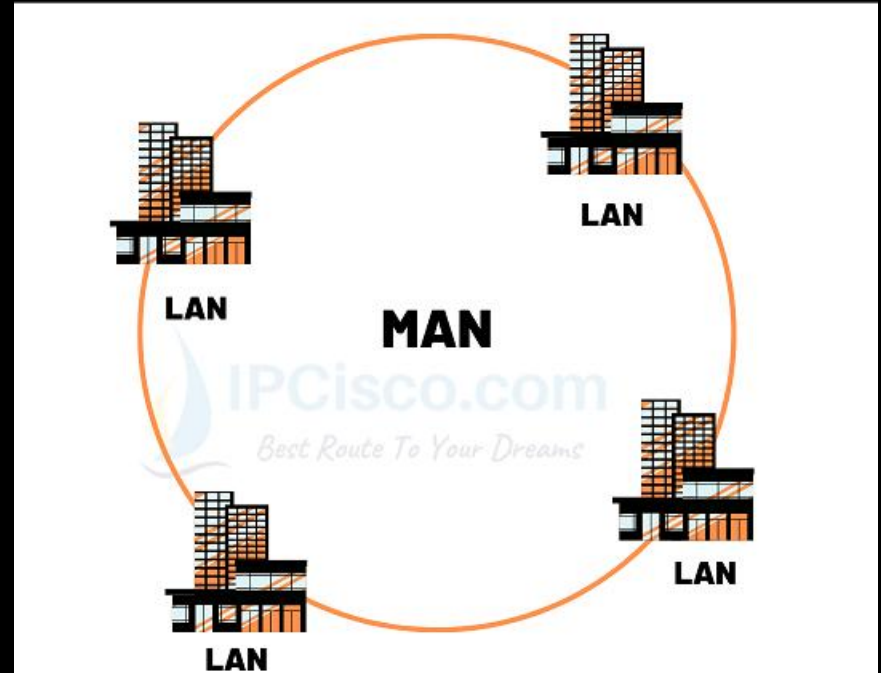
3. Campus Area Network

➢ Campus Area Network (CAN) is a group of interconnected Local Area Networks (LAN) within a limited geographical area like school campus, university campus, military bases, or organizational campuses and corporate buildings etc.

➢ A Campus Area Network is larger than Local Area Network but smaller than Metropolitan Area Network (MAN) and Wide Area Network (WAN).

➢ Campus Area Network covers areas of around 1 to 5 km range and it can be both wired or wireless connectivity.

Library

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CAMPUS NETWORK

Admission Section

Examination Section

CAMPUS AREA NETWORK (CAN)

4. Metropolitan Area Network

1. A MAN is larger than a LAN but smaller than or equal in size to a WAN.
2. In MANs, mainly fiber optic cables are used. This is because the covered distance. Fiber optic provides good performance for these types of networks. Wireless technology can be also sued for MANs.
3. MANs are costly networks and it need experienced network engineers for MAN administration.

Metropolitan Area Network (MAN)

LAN
LAN
MAN
IPCisco.com
Best Route To Your Dreams
LAN
LAN

5. Wide Area Network

- **A Wide Area Network exist over a large area**

- **Data travels through telephone or cable lines**

- **Usually requires a Modem**

- **The world's largest Wide Area Network in the Internet**

- **WANs are slower than MANs and LANs. Because it covers a very large geographical area.**


Wide Area Network (WAN)
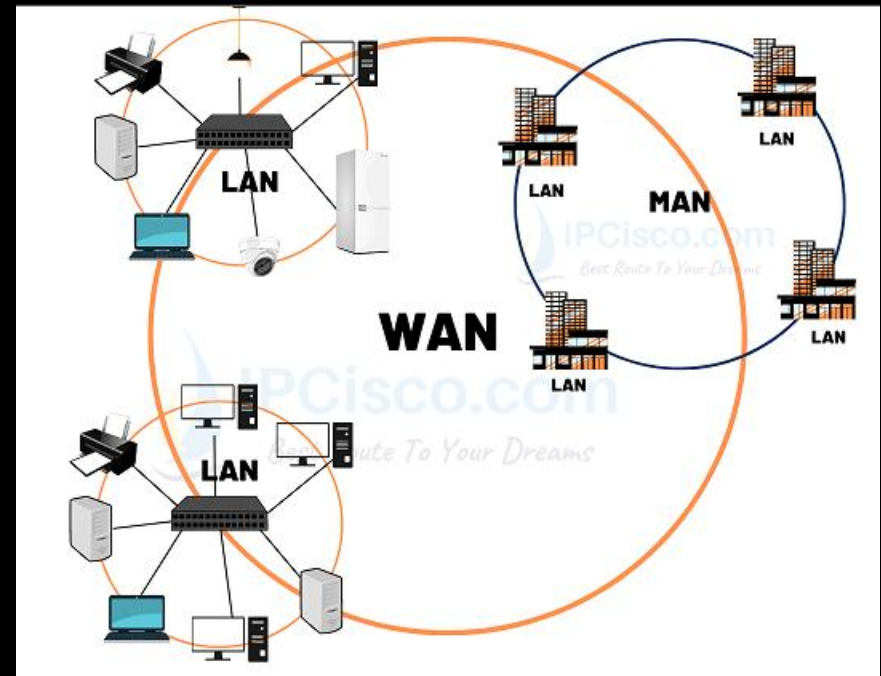
6. Storage Area Network

➢ A storage area network (SAN) is a dedicated high-speed network that makes storage devices accessible to servers by attaching storage directly to an operating system. It centralizes storage devices so they are easier to manage and communicate faster over media.

➢ Organizations need to provide users reliable access to data at all times.

➢ Data of all types, is growing exponentially.

➢ Cloud computing, digitization, and other IT trends are placing higher demands on the technology used to manage, transport, back up, and restore data.

Servers and applications

Storage

Storage Area Network
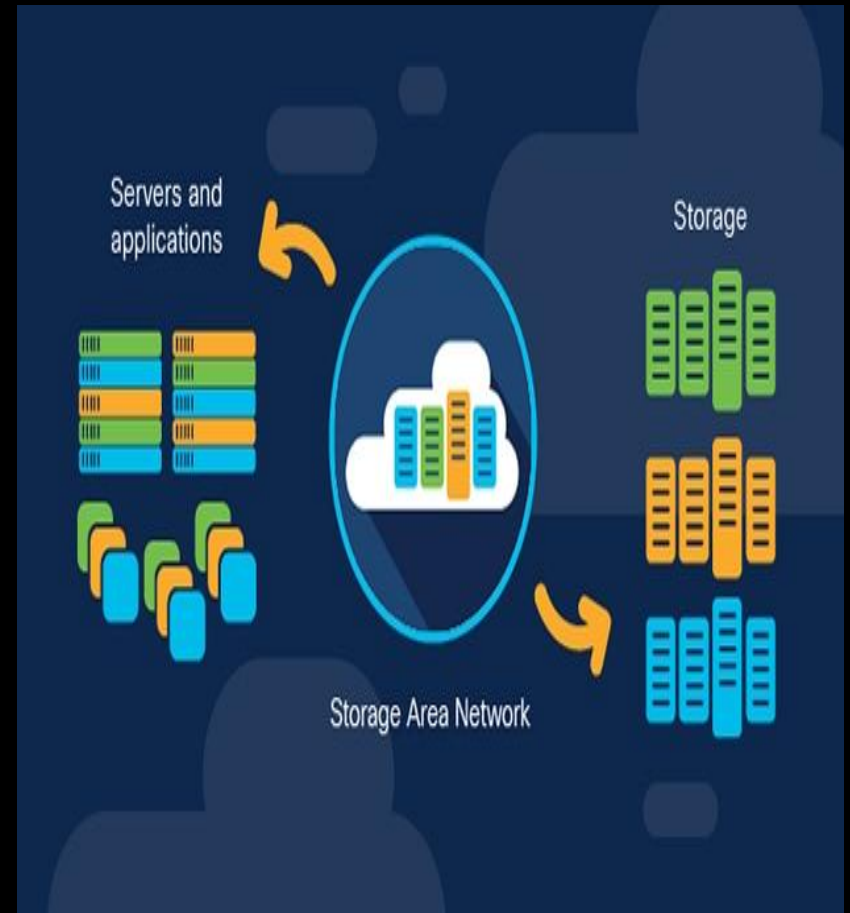
7. Virtual Private Network

➢ VPN is a private network that can access public networks remotely. VPN uses encryption and security protocols to retain privacy while it accesses outside resources.

➢ When employed on a network, VPN enables an end user to create a virtual tunnel to a remote location. Typically, telecommuters use VPN to log in to their company networks from home.
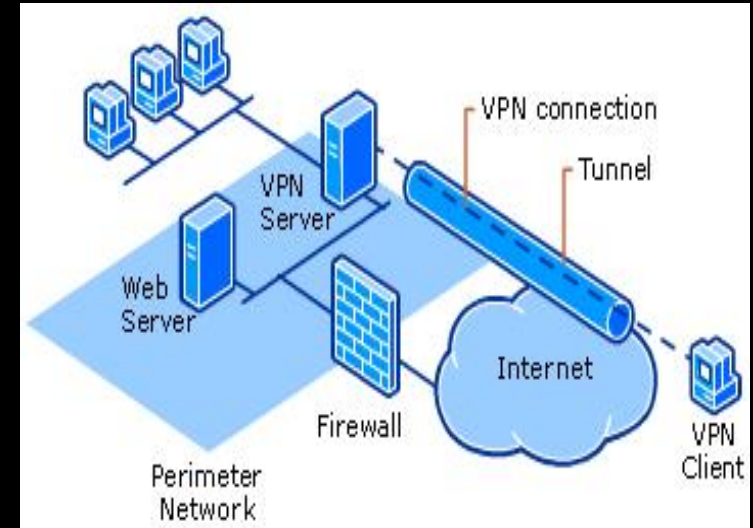

➢ *Authentication* is provided to validate the identities of the two peers.
➢ *Confidentiality* provides encryption of the data to keep it private from prying eyes.
➢ *Integrity* is used to ensure that the data sent between the two devices or sites has not been tampered with.

8. Client/Server Network

➢ In a client/server arrangement, network services are located on a dedicated computer called a server.

➢ The server responds to the requests of clients.

➢ The server is a central computer that is continuously available to respond to requests from clients for file, print, application, and other services.

➢ Most network operating systems adopt the form of a client/server relationship.

➢ Typically, desktop computers function as clients, and one or more computers with additional processing power, memory, and specialized software function as servers.
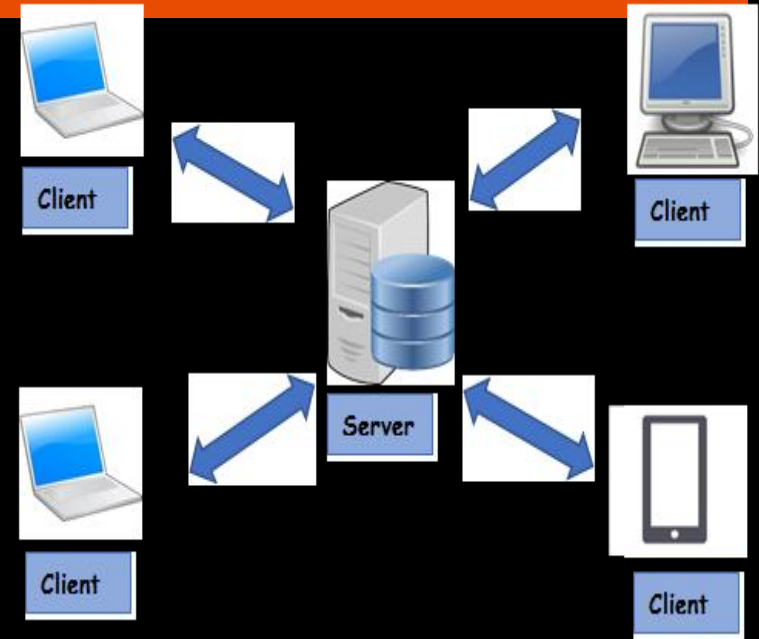
9. Peer to Peer Network
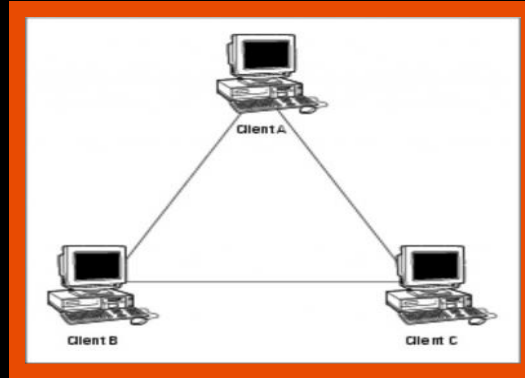
- ➢ **Usually very small networks**
- ➢ **Each workstation has equivalent capabilities and responsibilities**
- ➢ **Does not require a switch or a hub.**
- ➢ **These types of networks do not perform well under heavy data loads.**