Cauvery College for Women (Autonomous)

Nationally Accredited (III Cycle) with 'A' Grade by NAAC

Annamalai Nagar, Tiruchirappalli-18.

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Programme : B.sc Maths

Batch : 2018-2019 Onwards

Semester : IV

Course : Principles of Information Technology

Course Code :16SACCS2

Unit : IV

Topics Covered : Communication Media,Network Topology & Architecture, Internet & its Uses, WWW,URL, HTML.

UNIT IV

Explain in detail about various categories of communication media.

Communication Media

Communication media refers to the means of delivering and receiving data or information. Channels are also called communication lines or links. A channel makes use of a variety of media.

Communication media includes

* Twisted - pair wire

* Coaxial cable

* Fiber optic cables

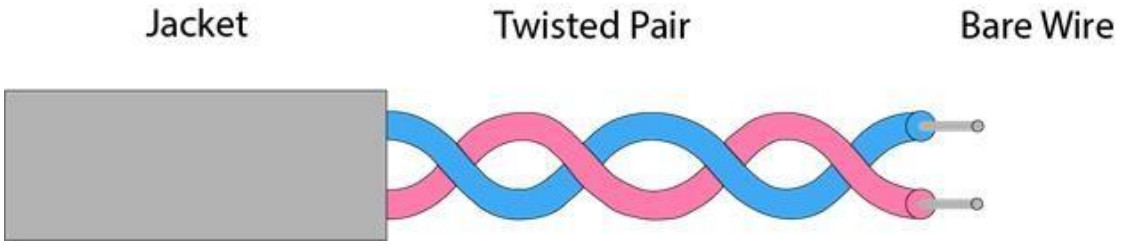
* Microwave systems

* Communication satellites

Twisted pair

Twisted pair is a physical media made up of a pair of cables twisted with each other. A twisted pair cable is cheap as compared to other transmission media. Installation of the twisted pair cable is easy, and it is a lightweight cable. The frequency range for twisted pair cable is from 0 to 3.5KHz.

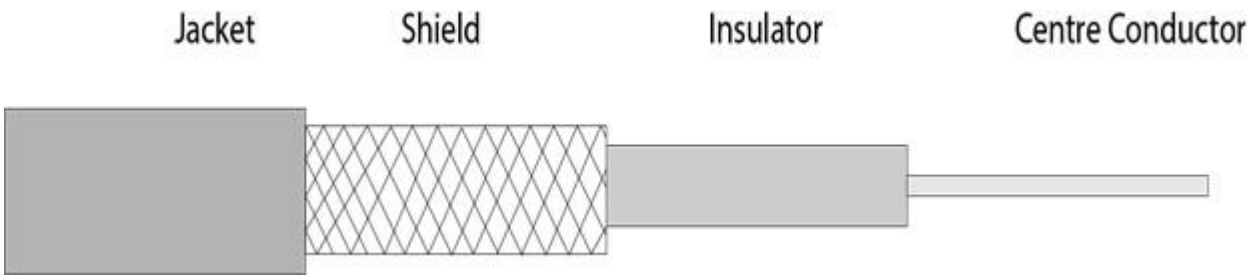
A twisted pair consists of two insulated copper wires arranged in a regular spiral pattern.



Coaxial Cable

- Coaxial cable is very commonly used transmission media, for example, TV wire is usually a coaxial cable.
- The name of the cable is coaxial as it contains two conductors parallel to each other.
- It has a higher frequency as compared to Twisted pair cable.
- The inner conductor of the coaxial cable is made up of copper, and the outer conductor is made up of copper mesh. The middle core is made up of non-conductive cover that separates the inner conductor from the outer conductor.

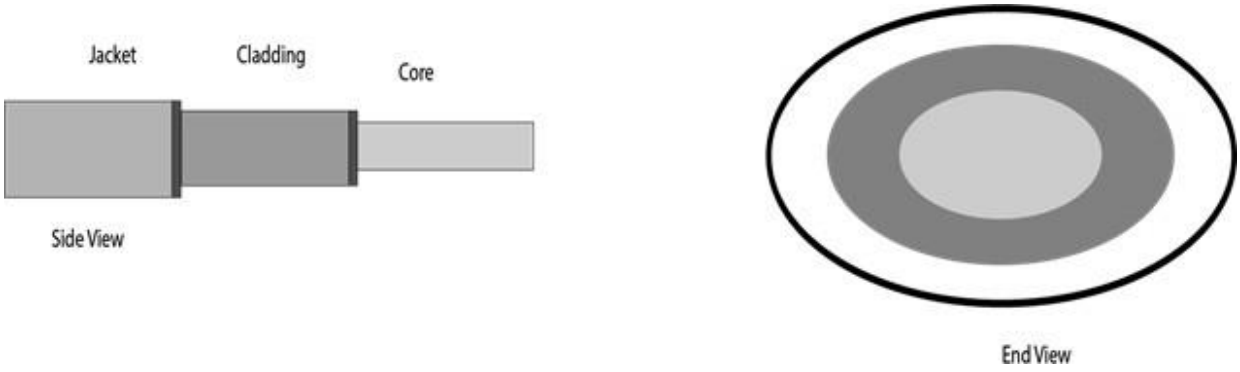
- The middle core is responsible for the data transferring whereas the copper mesh prevents from the EMI(Electromagnetic interference).



* Fibre Optics

- Fibre optic cable is a cable that uses electrical signals for communication which holds the optical fibres coated in plastic that are used to send the data by pulses of light.
- The plastic coating protects the optical fibres from heat, cold, electromagnetic interference from other types of wiring.
- Fibre optics provide faster data transmission than copper wires.

Diagrammatic representation of fibre optic cable:



Basic elements of Fibre optic cable:

- Core: The optical fibre consists of a narrow strand of glass or plastic known as a core. A core is a light transmission area of the fibre. The more the area of the core, the more light will be transmitted into the fibre.
- Cladding: The concentric layer of glass is known as cladding. The main functionality of the cladding is to provide the lower refractive index at the core interface as to cause the reflection within the core so that the light waves are transmitted through the fibre.
- Jacket: The protective coating consisting of plastic is known as a jacket. The main purpose of a jacket is to preserve the fibre strength, absorb shock and extra fibre protection.

Advantages of fibre optic cable :

- Greater Bandwidth: The fibre optic cable provides more bandwidth as compared copper. Therefore, the fibre optic carries more data as compared to copper cable.
- Faster speed: Fibre optic cable carries the data in the form of light. This allows the fibre optic cable to carry the signals at a higher speed.

- Longer distances: The fibre optic cable carries the data at a longer distance as compared to copper cable.
- Better reliability: The fibre optic cable is more reliable than the copper cable as it is immune to any temperature changes while it can cause obstruct in the connectivity of copper cable.
- Thinner and Sturdier: Fibre optic cable is thinner and lighter in weight so it can withstand more pull pressure than copper cable.

Microwave Systems

Microwave systems transmit high-speed radio signals in a line-of-sight path between relay stations spaced 25to 35 miles apart.

Communication Satellites

Communication satellites are also used as microwave relay stations and space orbit 22,000 miles apart above the earth.

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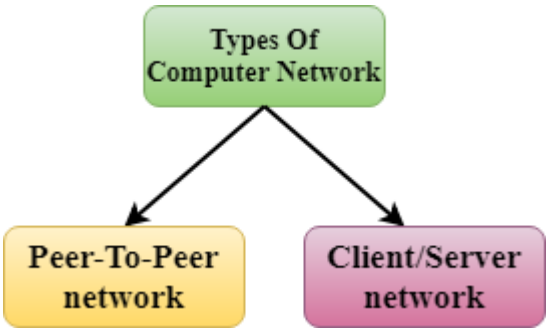
Elucidate network architecture in detail.

Network Architecture

Computer Network Architecture is defined as the physical and logical design of the software, hardware, protocols, and media of the transmission of data (i.e how computers are organized and how tasks are allocated to the computer).

The two types of network architectures are used:

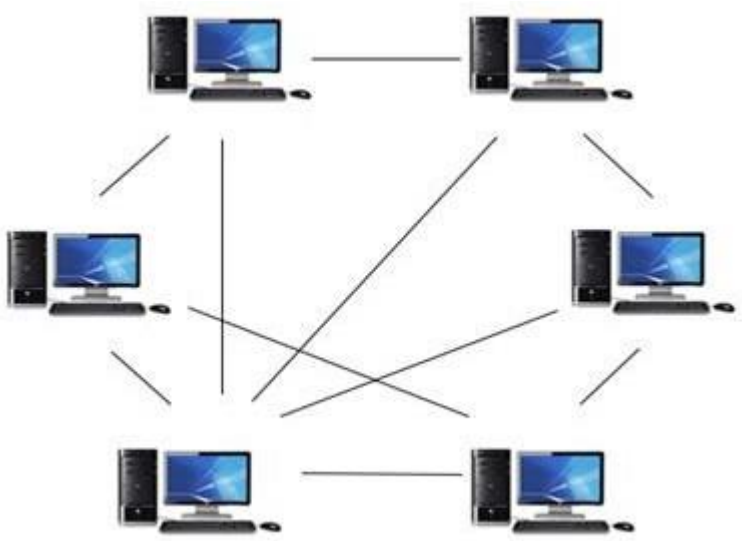


- Peer-To-Peer network
- Client/Server network

Peer-To-Peer network Architecture

- Peer-To-Peer network is a network in which all the computers are linked together with equal privilege and responsibilities for processing the data.

- Peer-To-Peer network is useful for small environments, usually up to 10 computers.
- Peer-To-Peer network has no dedicated server.
- Special permissions are assigned to each computer for sharing the resources, but this can lead to a problem if the computer with the resource is down.



Advantages Of Peer-To-Peer Network:

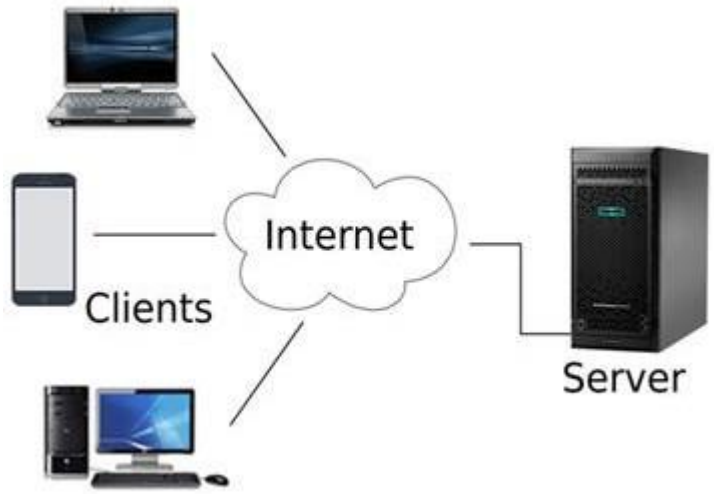
- It is less costly as it does not contain any dedicated server.
- If one computer stops working but, other computers will not stop working.
- It is easy to set up and maintain as each computer manages itself.

Disadvantages Of Peer-To-Peer Network:

- In the case of Peer-To-Peer network, it does not contain the centralized system . Therefore, it cannot back up the data as the data is different in different locations.
- It has a security issue as the device is managed itself.

Client/Server Network Architecture

- Client/Server network is a network model designed for the end users called clients, to access the resources such as songs, video, etc. from a central computer known as Server.
- The central controller is known as a server while all other computers in the network are called clients.
- A server performs all the major operations such as security and network management.
- A server is responsible for managing all the resources such as files, directories, printer, etc.
- All the clients communicate with each other through a server. For example, if client1 wants to send some data to client 2, then it first sends the request to the server for the permission. The server sends the response to the client 1 to initiate its communication with the client 2.



Advantages Of Client/Server network:

- A Client/Server network contains the centralized system. Therefore we can back up the data easily.
- A Client/Server network has a dedicated server that improves the overall performance of the whole system.
- Security is better in Client/Server network as a single server administers the shared resources.
- It also increases the speed of the sharing resources.

Disadvantages Of Client/Server network:

- Client/Server network is expensive as it requires the server with large memory.
- A server has a Network Operating System(NOS) to provide the resources to the clients, but the cost of NOS is very high.
- It requires a dedicated network administrator to manage all the resources.

Explain in detail about Network Topologies.

What is Topology?

Topology defines the structure of the network of how all the components are interconnected to each other.

Common topology includes are

* Star

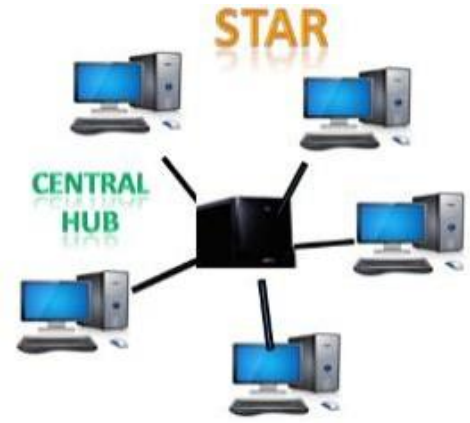
* Ring

* Bus

Star Topology

- Star topology is an arrangement of the network in which every node is connected to the central hub, switch or a central computer.

- The central computer is known as a server, and the peripheral devices attached to the server are known as clients.
- Coaxial cable cables are used to connect the computers.
- Hubs or Switches are mainly used as connection devices in a physical star topology.
- Star topology is the most popular topology in network implementation.



It is most popular on LAN networks as they are inexpensive and easy to install.

Advantages:

Benefits of start topology:

- Easy to troubleshoot, set up, and modify.
- Only those nodes are affected, that has failed. Other nodes still work.
- Fast performance with few nodes and very low network traffic.
- In Star topology, addition, deletion, and moving of the devices are easy.

Disadvantages:

Drawbacks of using Star:

- If the hub or concentrator fails, attached nodes are disabled.
- Cost of installation of star topology is costly.
- Heavy network traffic can sometimes slow the bus considerably.
- Performance depends on the hub's capacity
- A damaged cable or lack of proper termination may bring the network down.

Ring Topology

In a ring network, every device has exactly two neighboring devices for communication purpose. It is called a ring topology as its formation is like a ring. In this topology, every computer is connected to another computer. Here, the last node is combined with a first one.

Ring Topology

This topology uses token to pass the information from one computer to another. In this topology, all the messages travel through a ring in the same direction.

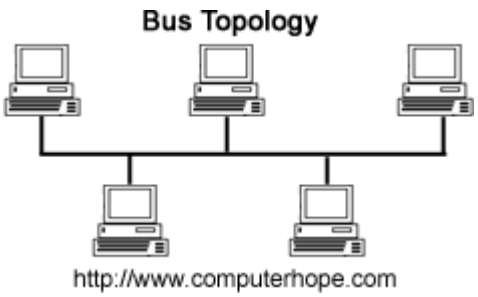
Advantages:

- Easy to install and reconfigure.
- Adding or deleting a device in-ring topology needs you to move only two connections.
- The troubleshooting process is difficult in a ring topology.
- Failure of one computer can disturb the whole network.
- Offers equal access to all the computers of the networks
- Faster error checking and acknowledgment.

Disadvantages:

- Unidirectional traffic.
- Break in a single ring can risk the breaking of the entire network
- Modern days high-speed LANs made this topology less popular.
- In the ring, topology signals are circulating at all times, which develops unwanted power consumption.
- It is very difficult to troubleshoot the ring network.
- Adding or removing the computers can disturb the network activity.

Bus Topology



Bus topology uses a single cable which connects all the included nodes. The main cable acts as a spine for the entire network. One of the computers in the network acts as the computer server. When it has two endpoints, it is known as a linear bus topology.

Advantages:

- Cost of the cable is very less as compared to other topology, so it is widely used to build small networks.
- Famous for LAN network because they are inexpensive and easy to install.
- It is widely used when a network installation is small, simple, or temporary.
- It is one of the passive topologies. So computers on the bus only listen for data being sent, that are not responsible for moving the data from one computer to others.

Disadvantages:

- In case if the common cable fails, then the entire system will crash down.
- When network traffic is heavy, it develops collisions in the network.
- Whenever network traffic is heavy, or nodes are too many, the performance time of the network significantly decreases.
- Cables are always of a limited length.

Internet and its Uses

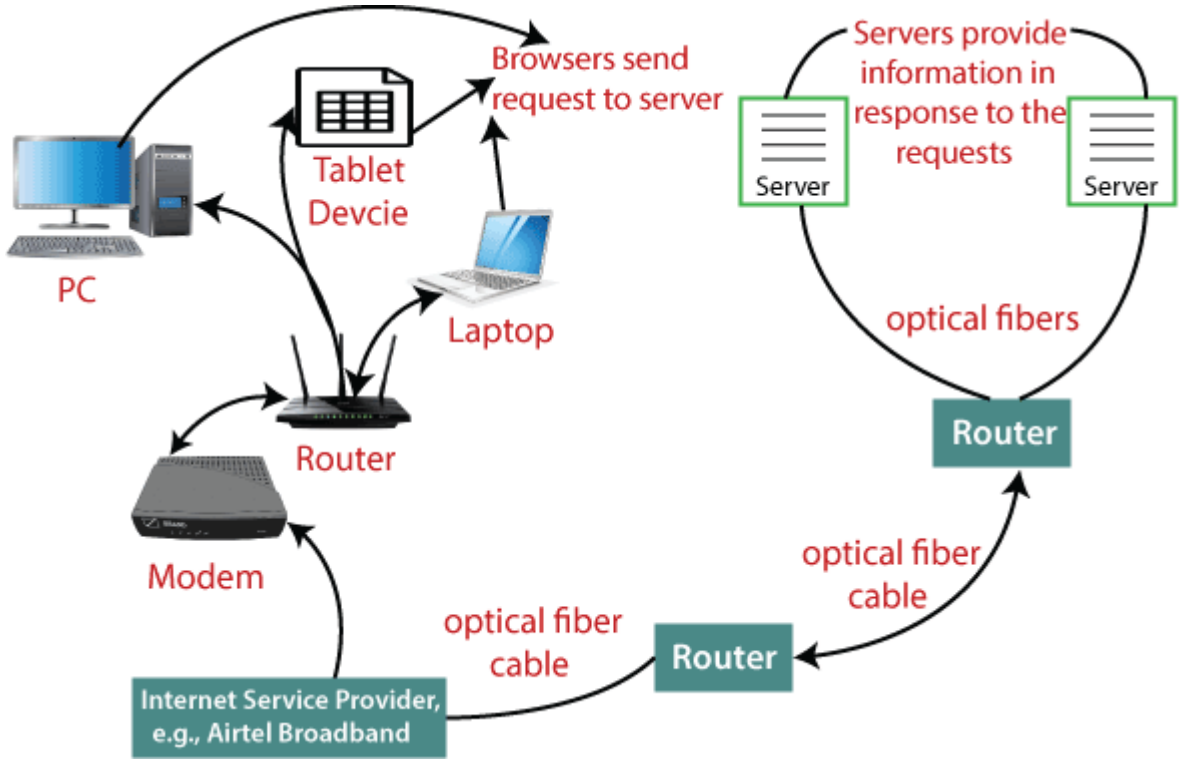
The Internet is an increasingly important part of everyday life for people around the world.

What is the Internet?

The internet is the largest computer network in the world, connecting millions of computers. A network is a group of two or more computer systems linked together.

Once we are connected to the Internet, we can access and view websites using a type of application called a web browser.

How does the Internet work?



Internet is a global network of physical cables, which can include copper telephone wires, TV cables, and fiber optic cables. Even wireless connections like Wi-Fi and 3G/4G rely on these physical cables to access the Internet.

When we visit a website, our computer sends a request over these wires to a server. A server is where websites are stored, and it works. Once the request arrives, the server retrieves the website and sends the correct data back to our computer.

Uses of Internet

Some of the ways the internet is used today

* Finding information online

* Chat and instant messaging

* Social networking

* Intelligent personal assistants

* Creating Blog

* Online Shopping

* Pay Bills

* Online Banking , Selling and Work from Home

* Entertainment

What is World Wide Web (WWW) ?

The World Wide Web is a virtual network of web sites connected by hyperlinks (or "links"). Web sites are stored on servers on the internet, so the World Wide Web is a part of the internet.

What is HTML (Hyper Text Markup Language)?

The backbone of the World Wide Web is made of HTML files, which are specially-formatted documents that can contain links, as well as images and other media. All web browsers can read HTML files. In addition to HTML, it's also very common for websites to use technologies like CSS (Cascading Style Sheets) and JavaScript to do more advanced things.

What is URL (Uniform Resource Locator)?

The URL, also known as the web address, tells the browser exactly where to find the page. However, most of the time, people get to a web page by following a link from a different page or by searching for the page with a search engine.