Introduction to Information Technology

CSC109

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By: Rajiv Raman Parajuli

5 Hrs

Chapter 7

Data Communication & Computer Network

Coverage

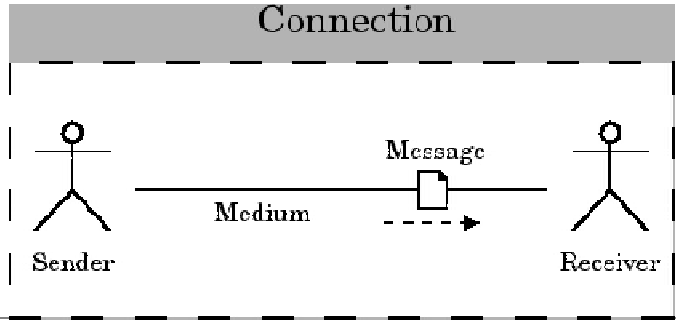
1. Importance of networking
2. Data transmission media
3. Data transmission across media
   a) Transmission modes
   b) Transmission speed
   c) Fundamentals of transmission
      i. Modulation and demodulation
      ii. Multiplexing—FDM, WDM
      iii. Asynchronous and synchronous transmission
4. Data transmission and data networking
   a) Switching

   * Important Topic is **Communication Protocol**

5. Computer network
   a) Network types
   b) Communication protocol
   c) Network devices
      i. Wireless networking

7.1 Introduction

- For communication of information and messages we use telephone and postal communication systems
- data and information from one computer system can be transmitted to other systems across geographical areas
- The methods include electrical signals carried along a **medium**(conductor, optical signals along an optical fibers and electromagnetic wave)



The following are the basic requirements for working of a communication system.

- A sender (source) which creates the message to be transmitted.
- A medium that carries the message.
- Language used for communication
- A receiver (sink) which receives the message.

*A computer network is a group of computer system and other computing hardware devices that are linked together through communicating channel. Which facilitate communication, resource sharing.

*Each computer can be called as node, so networking in another term is interconnection of two or more nodes through transmission medium.

*Computers can be connected via transmission medium like copper wires, optical fiber, communication satellite, radio links (Microware) etc.

7.2 Importance Of Networking

As N/W provides a platform for communication users and information, uses/ importance as follows:

1. Resource Sharing
2. Information Sharing
3. As a communication medium
4. Centralize administration and support
5. Back-up and Support

Regardless of So many benefits of networking, still there are some Disadvantages we could discuss over.

1. Expensive- (Setup resources and additional hardware)
2. Security of data
3. Needs special technical knowledge
4. Venerable to computer Virus and Malware.

Data Communication 4 Basic Terms

- **Data:** A collection of facts in raw forms that become information after processing.
- **Signals:** Electric or electromagnetic encoding of data.
- **Signaling:** Propagation of signals across a communication medium.
- **Transmission:** Communication of data achieved by the processing of signals.

7.3 Data Transmission Media

The data is sent from one computer to another over a transmission medium, grouped as guided and unguided medium

1. **Guided media**

✓Physical Transmission Path

✓Copper wire & Optical fiber are most commonly used

✓Copper wire transmit as electric signal while optical one transmit as light signal.

✓Copper wire offer low resistance to current signal, fascinating longer distance transmission

✓Eg: Twisted pair cable, Co-axial cable, optical fiber etc.

2. Unguided media

- ✓data signals are not bounded by a fixed channel to follow.
- ✓The data signals are transmitted by air.
- ✓Eg: Radio, microwave, and satellite transmissions

7.3.1 Wire Pair/Twisted Pair

Wire pairs are commonly used in local telephone Communication and for short distance digital data communication.

They are usually made up of copper and the pair of wires is twisted together

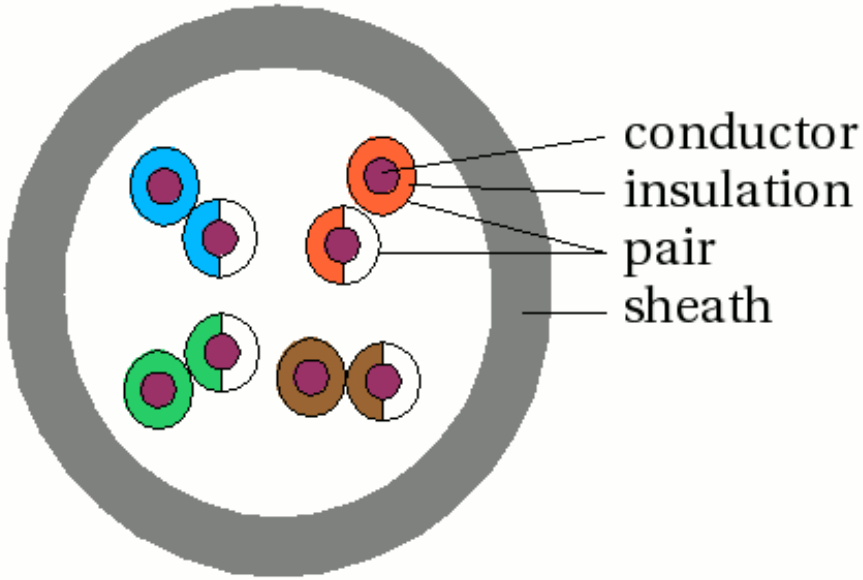
pairs of copper wires coated with an insulating material like plastic or Teflon

twisting of wires reduces electromagnetic interference from external sources

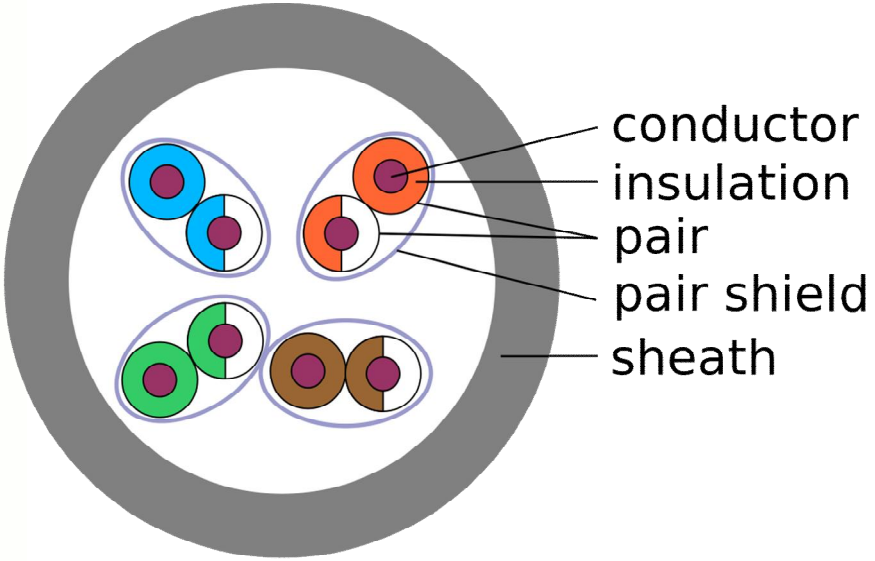
Twisted pair is of two kinds—Shielded Twisted Pair (STP), and Unshielded Twisted Pair (UTP).

Data transmission speed is normally 9600 bits per second in a distance of 100 meter.

UTP


conductor
insulation
pair
sheath

STP


conductor
insulation
pair
pair shield
sheath

7.3.2 Coaxial Cable

They consist of a central copper wire surrounded by an insulation over which copper mesh is placed.

The inner conductor, insulator, and the outer conductor are wrapped in a sheath of Teflon or PVC.

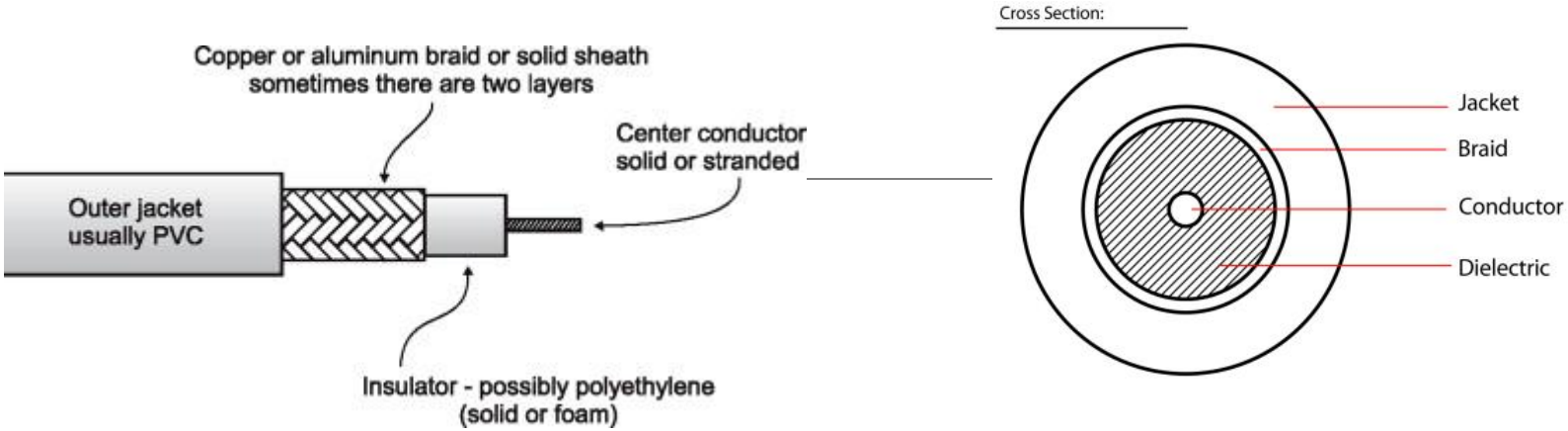
Inner wire is used for signal transmission while outer conductor is used for grounding purpose

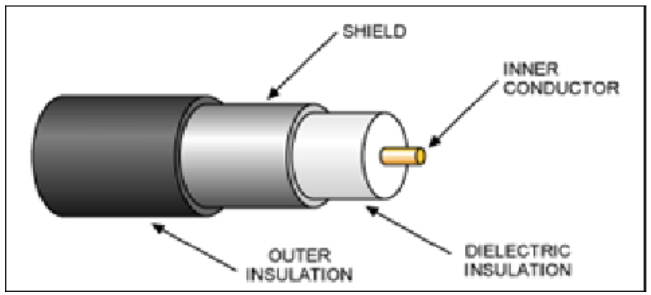
Insulator provides resistance to external electromagnetic filed and signal is transmitted without power loss.

Thickness of coaxial cable affect the amount of data it can transfer.

They are used for long distance telephone lines and local area network for their noise immunity and faster data transfer.

The commonly used coaxial cable is 10 base 2 that transmits over a distance of 185 m, and 10 base 5 that transmits over a distance of 500 m.


Copper or aluminum braid or solid sheath
sometimes there are two layers
Center conductor
solid or stranded
Outer jacket
usually PVC
Insulator - possibly polyethylene
(solid or foam)
Cross Section:
Jacket
Braid
Conductor
Dielectric


SHIELD
INNER
CONDUCTOR
OUTER
INSULATION
DIELECTRIC
INSULATION