COMPUTER SYSTEMS SERVICING

Learning Outcome 1
Install Network Cable

Computer Network Concepts

Information Sheet 1.1

COMPUTER NETWORK

A computer network is defined as the interconnection of two or more computers or other devices. It allows nodes and links to share resources and information. Node refers to any computer or digital device that use the network. Link refers to the physical connection to the network .

The most common resource shared today is connection to the Internet. Other shared resources can include a printer or a file server. The Internet itself can be considered a computer network. Networked computers can share hardware, software and data.

What Do Networks Do?

Computer networks are used to carry out a large number of tasks through the sharing of information.

Some of the things that networks are used for include: Communicating using email, video, instant messaging and other methods

- Sharing devices such as printers, scanners and photocopiers
- Sharing files
- Sharing software and operating programs on remote systems
- Allowing network users to easily access and maintain information

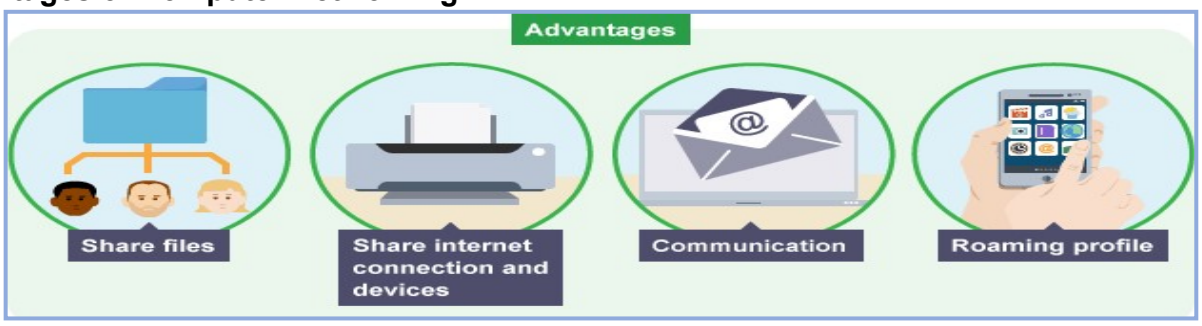
Components of Computer Network

A computer network is build up from several components. These components together makes it possible to transfer data from one device to another and makes smooth communication between two different devices.

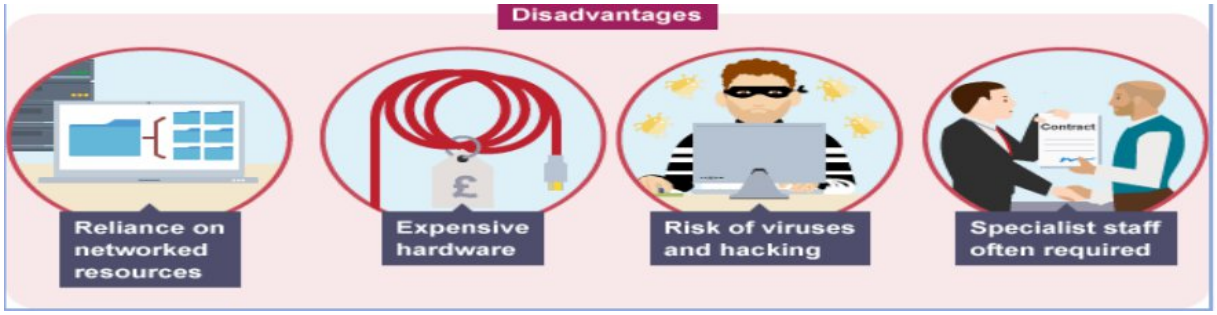
- **Servers** –These are the machines that hold different kinds of programs or files that can be accessed by another computer that is present in the network. Some of the servers are database server, file server, print server, etc.

- **Clients** – These are computers that request or get the information or service from the servers to access the network resources.
- **Access points** – This allows the computer to connect to the wireless network, ie. Without the use of cables. This provides flexibility to mobile users.
- **Shared data** – These are the data that is shared between the client like files, programs, and email.
- **Network interface card** – This controls the data flow between the computer and network. A network interface card can send and receive data.
- **Transmission media** – These are the mode through which data is transferred from one device to another. Transmission media can be fiber optic cables, coaxial cables or infra-red waves, microwaves, etc.
- Connecting devices – These are the middleware between computers and networks. which binds them together. Some of the connecting devices are –
    - Bridges
    - Routers
    - Gateways
    - Hubs
    - Switches
    - Repeaters

Advantages of Computer Networking



Disadvantages of computer system



Types of Computer Network (Geographic)

Information Sheet 1.2

1. Personal Area Network (PAN)

Personal Area Network is a computer network formed around a person. It is typically set up to share resources within a personal computer such as wireless keyboard and mouse, Bluetooth enabled headphones and speakers, wireless printers, scanners, and more. PAN can be used for establishing communication among these personal devices for connecting to a digital network and the internet. PANs can usually be installed in a range of about ten meters.

PAN networks are relatively secure and safe but it may establish a bad connection to other networks at the same radio bands and has distance limits.

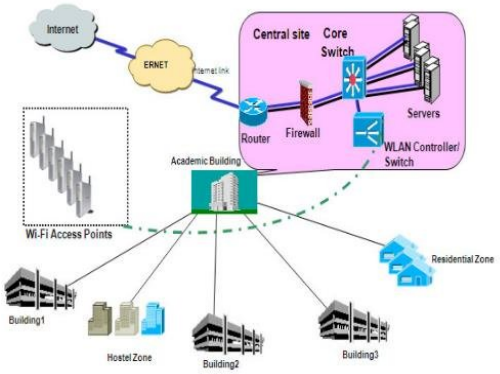
2. Local Area Network (LAN)

Local Area Network is a group of computer and peripheral devices which are connected in a limited area such as school, laboratory, home, and office building. It is a widely useful network for sharing resources like files, printers, games, and other application. LANs are built with inexpensive networking and routing equipment such as hubs, network adapters, and ethernet cables, etc. Various devices in a LAN are connected to a central device called a Hub or switch. The LAN can be installed simultaneously in wired, wireless, or both forms. However, LAN typically relies on wired connections for better speed and increased security.

3. Campus Area Network (CAN)

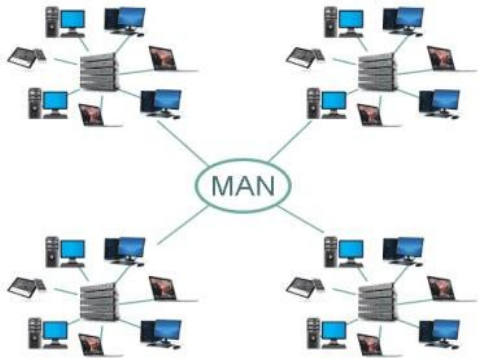
Campus Area Network be defined as a connection of various (two or more) Local Area Networks (LANs) in a limited geographical area. While the LAN may be limited to a building or residence or school etc, CAN connect several buildings in a limited area.

A CAN is thus wider than LAN. CAN be used in interconnecting networks in military bases, dedicated laboratories, educational campuses i.e. of schools or universities or various departments in a limited geography.



4. Metropolitan Area Network

A Metropolitan Area Network or MAN is consisting of a computer network across an entire city, college campus, or a small region. This type of network is larger than a LAN, which is mostly limited to a single building or site. Depending upon the type of configuration, this type of network allows you to cover an area from several miles to tens of miles.



It mostly covers towns and cities in a maximum 50 km range and mostly used medium is optical fibers, cables.

5. Wide Area Network (WAN)

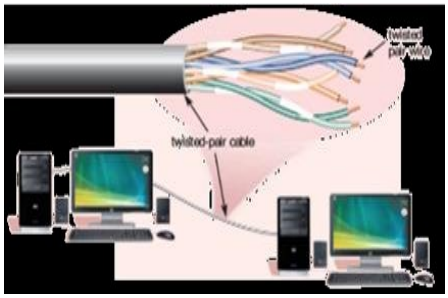
Wide Area Network is a network that covers a large geographical area such as states, countries, or the entire world. WAN is generally a connection between LANs and MANs. WANs are considered as the slowest data communication medium because of the largest distances. An installation cost of a wide area network is very high as it uses expensive equipment. WAN uses Optic Wires, Microwaves, and Satellite for data transmission.

The internet is one of the biggest WAN in the world. These normally do not belong to one company but exist with distributed ownership.

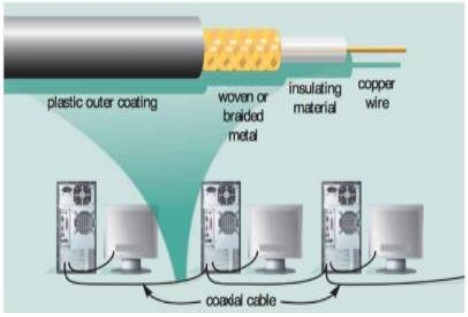
Information Sheet 1.3

Transmission Media

Classification of Wired Transmission Media

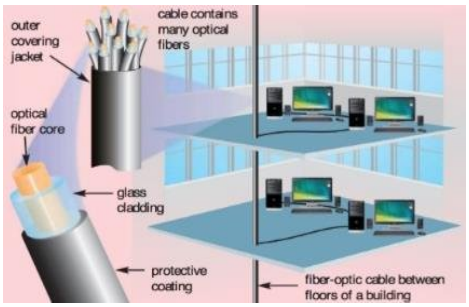


Twisted Pair Cable – It is one of the most used transmission media for network cabling and telephone systems. Twisted-pair cable consists of one or more twisted-pair wires bundled together. Each twisted-pair wire consists of two separate insulated copper wires that are twisted together. The wires are twisted together to reduce noise. Noise is an electrical disturbance that can degrade communications.



Coaxial Cable - consists of a single copper wire surrounded by at least three layers: (1) an insulating material, (2) a woven or braided metal, and (3) a plastic outer coating. Cable television (CATV) network wiring often uses coaxial cable because it can be cabled over longer distances than twisted-pair cable.

Fiber Optics - The core of a fiber-optic cable consists of dozens or hundreds of thin strands of glass or plastic that use light to transmit signals. Each strand, called an optical fiber, is as thin as a human hair. Inside the fiber-optic cable, an insulating glass cladding and a protective coating surround each optical fiber. It has faster data transmission, smaller size and better security for signals during transmission because they are less susceptible to noise.



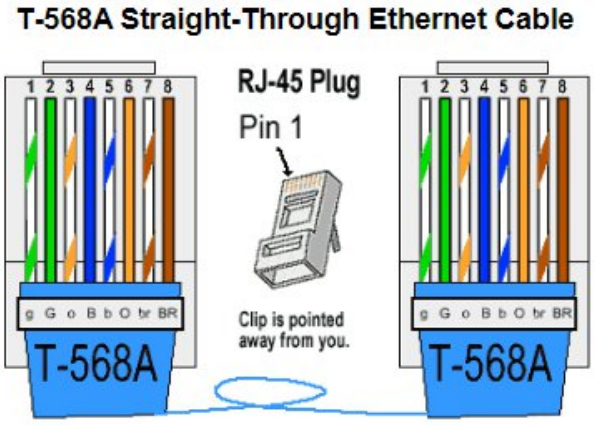
Information Sheet 1.4

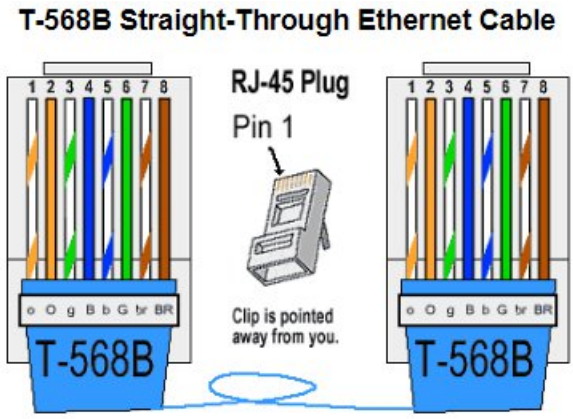
Making Ethernet Cable

The TIA/EIA 568-A standard which was ratified in 1995, was replaced by the TIA/EIA 568-B standard in 2002 and has been updated since. Both standards define the T-568A and T-568B pin-outs for using Unshielded Twisted Pair cable and RJ-45 connectors for Ethernet connectivity. The standards and pin-out specification appear to be related and interchangeable, but are not the same and should not be used interchangeably.

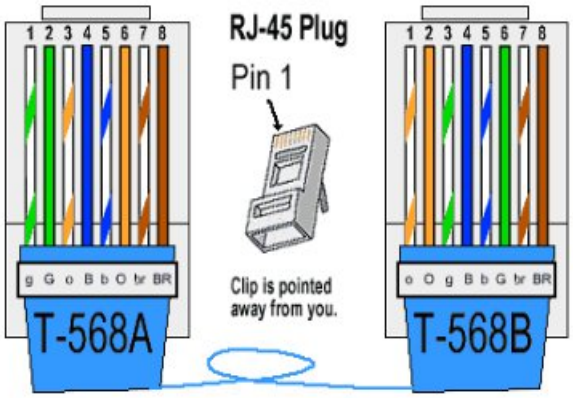
Purchasing Ethernet cables can be quite expensive and pre-made lengths are not always the length you need. Making Ethernet cables is easy with a box of bulk Category 5e Ethernet cable and RJ-45 connectors that are attached to the cut ends of your preferred cable length. These are two kinds of Ethernet cables you can make:

Straight-Through Cables- Most commonly used to connect a host to client. It is used to connect computers, printers and other network client devices to the router switch or hub (different host connection).





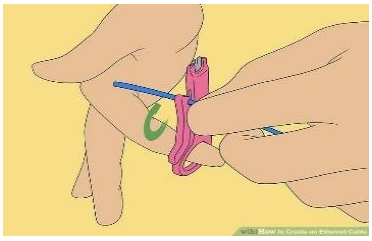
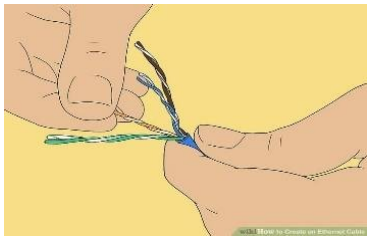
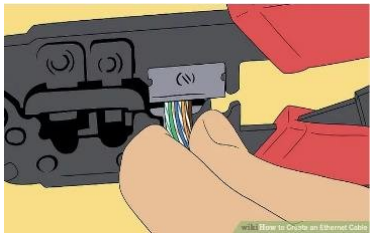
Crossover Cables - The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub.



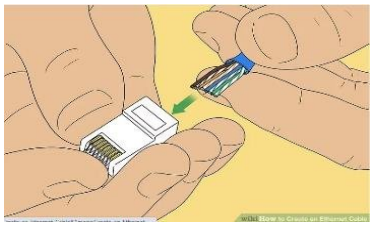
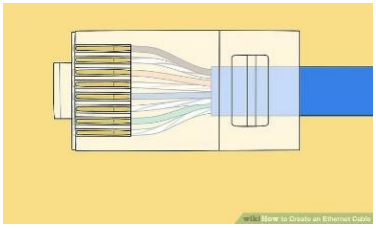
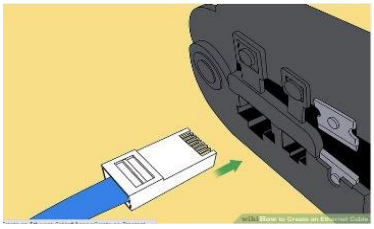
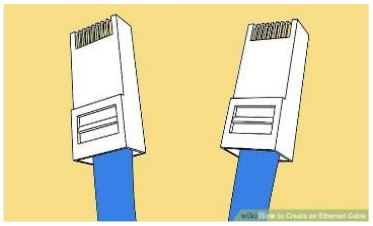
How to make standard ethernet cables:
Tools Needed Materials:

Crimping Tool
Wire Cutter
RJ45
Wire Stripper
LAN Tester
CAT5e Cable

Procedures
1. Strip your cable. Use your cable strippers at about 1-2 inches from the end of the cable to remove
the outer jacket.
2. Untwist the twisted pair wires all the way back to the jacket.
3. Align the untwisted wires in the order necessary for your needs.
4. Cut the extra wire by using wire-cutting scissors/ wire cutter.


5. Push the remaining wires into the RJ45 head**.** Be careful not to bend the wires while pushing them in or you run the risk of creating a bad cable. A short length of the jacket should be up the RJ45 head.
6. Double-check that the wires are all the way up into the gold pins of the head and made it up in the proper order.
7. Push the head into the open space of the crimping tool and squeeze it closed, hard.
8. Repeat the crimping process on the other side of the cable if you're making a completely new cable**.** For a standard "Straight Through" cable, repeat all steps and wire color order on the other end of cable. For a cross-over cable, the other end will have a different color order.

9. Plug one end of the cable into the tan, two-port end of the cable tester, and the other end into the other part of the tester with the graphic display window.