

Computer Networks

CS361 Lab5

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Questionnaire:

- 1) What cable types are available?
- 2) How do cables work?
- 3) How are cables used in networking?
- 4) How are connections made?

Networking Cable Types:(Ans1)

There are several types of networking cables commonly used for different purposes. Here are some of the most prevalent ones:

Ethernet Cables: For wired networks, Ethernet cables—also referred to as UTP (Unshielded Twisting Pair) cables. UTP cables consist of twisted pairs of copper wires. In recent times, among its categories, Cat5e, Cat6, or Cat7 cables—are frequently utilized. There are available in many categories, with varying data transfer speeds supported by each. Up to 1 Gbps is supported by Cat5e, 10 Gbps by Cat6 and 100 Gbps by Cat7.



Types of Ethernet cables:

Copper Straight-Through Cable: This kind of cable is used to link various kinds of equipment with various purposes in a network. It's frequently used, for instance, to link a PC to a network switch, router, or modem. Data can go over a straight-through cable from one device to another because the wiring configuration on one end of the wire is precisely duplicated on the other.

Copper Crossover cable: A crossover cable is used to link comparable equipment together, like a router connecting to another router or a computer connecting to another computer or network switch. A crossover cable modifies the wiring layout to move the transmit signals from one device to the receiving pins of the other, and the other way around.

Fibre Optic Cable: Fibre optic cables can transfer data across great distances at very fast rates because they use light signals to do it. Long-distance connections and high-performance networks frequently use them.



I) Single-mode fibre: Using a single glass fibre strand, this type of fibre is intended for long-distance transmission and has a very high bandwidth for data transmission over great distances.

II) Multi-mode fibre: Suitable for shorter distances, it is frequently utilised in campus networks and data centres. It consists of numerous glass fibre strands.

Coaxial Cable:

Internet and cable TV hookups frequently employ coaxial cables. They consist of an outside insulating layer, a metal shield, and an insulating substance surrounding a centre copper conductor.



Working Principles: (Ans2)

Data signals are transmitted between devices via networking wires. Electrical signals are used to transfer data while using Ethernet wires, for instance. An Ethernet cable creates a connection when it is plugged into a device (such a computer or router), enabling data transmission and reception between those devices on a network.

A specific technology known as **twisted pair** wiring are used for Ethernet wires. Twisted wires are arranged in several pairs inside the cable. These twisted wires are generally of two types. Shielded and unshielded. Multiple pairs of wires are twisted together in UTP cables to lessen electromagnetic interference between nearby lines. One cable delivering data and another receiving data make up each pair. By reducing electromagnetic interference from cables and other equipment, this twisting contributes to a stable connection.

On the other hand, Data is transmitted over **optical fibre cables** using light pulses that pass through a small strand of glass or plastic fibre and it follows total internal reflection process. A laser or LED transmitter is used to transform data into light

signals that are transmitted across the cable. Because of total internal reflection, these light signals pass through the fiber-optic core and bounce off the cladding. Fibre optics are the perfect solution for high-speed, long-distance data transmission since the signals can travel great distances with little loss of strength.

Usage of Cables in Networking: (Ans3)

An essential part of wired computer networks are cables. They facilitate data transmission by establishing physical links between different network components. The following are the main applications for cables in networking:

Data Transmission: In networking, cables make it easier for digital data to move between devices. When using fibre optic cables, the data is transmitted as light pulses, whereas electrical signals are used when using copper connections. The binary code (0s and 1s) carried by these signals enables the transport of data, including files, emails, and multimedia material.

Electrical Impulses: Electrical impulses pass through the twisted pairs of wires in copper-based Ethernet cables. The cable's construction, which includes the wires' twisting, helps shield it from interference from other cables and electrical equipment. These electrical signals are interpreted by the receiving equipment, which then processes the data.

Bandwidth and Speed: The bandwidth and data transfer speeds provided by various cable types differ. Faster data transfer rates are supported by higher-quality cables that use more sophisticated technologies. Higher bandwidths may be handled by Cat6 and Cat7 Ethernet cables, for instance, which makes them appropriate for high-speed data transmission applications like online gaming and streaming high-definition video.

Interference and Reliability: By reducing interference, properly installed and insulated cables provide dependable data transmission. Electromagnetic fields, other electronic devices, or even physical damage to the connections can all result in interference. STP Ethernet cables are examples of shielded cables that are made to

lessen electromagnetic interference, guaranteeing dependable and secure data transfer.

Duplex Communication: Networking cables allow for duplex communication, which allows data to be transferred and received at the same time. Low latency and continuous data flow are critical for real-time applications such as online gaming and video conferencing, where full duplex communication is required.

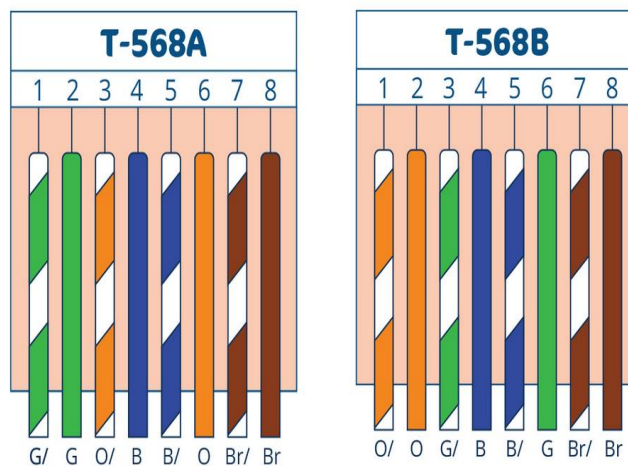
Making Connections: (4)

Tools Required for connection for UTP cables (Ethernet):

- Cat5e cable
- RJ45 connectors
- Cable stripper
- Scissors
- Crimping tool

Connection Procedure:

- ❖ First, the networking cable needs to be prepped by removing the outer insulation to reveal the inner wires. And about 1-1.5inch of the outer insulation is to be removed.
- ❖ After that, the wires are untwisted and organised in accordance with the T568A or T568B wiring standard that is necessary for the particular kind of cable being used (straight or cross).



- ❖ After arranging the wires according to T568-A or T568-B, trim the wires evenly and keep about 0.5 inch open.
- ❖ Then maintaining proper order from left to right insert the wires properly into the RJ45 connector. The connector will be facing downward.
- ❖ If all the wires extend to the end and the sheath is well inside the connector, cramping can be done. For Cramping, cramping tools are used. The tool has to be squeezed firmly to crimp connector onto cable end.



- ❖ Finally, for checking a LAN tester is used. In that the 2 RJ45 connectors of a wire is inserted into the 2 slots of LAN Tester. Then the tester is turned on. As soon as it is turned on the machine checks all the 8 wires and if all wires are okay and active green light is blinked against all the 8 options. The green light indicates that the ethernet cable is functional and ready for data transmission.

