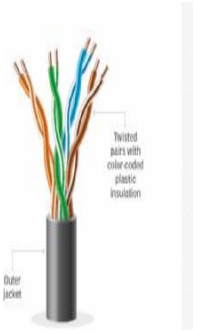
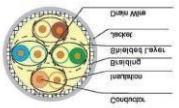
Practical-2

Aim: Study of different types of Network cables.

a) Understand different types of network cable.

Different type of cables used in networking are:

1. Unshielded Twisted Pair (UTP) Cable
2. Shielded Twisted Pair (STP) Cable
3. Coaxial Cable
4. Fibre Optic Cable

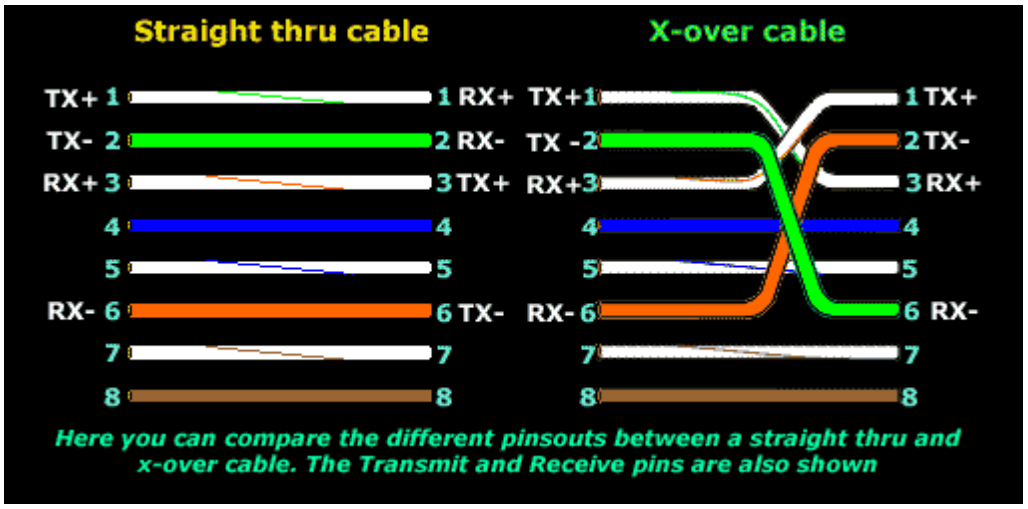
Cable type	Category	Maximum Data Transmission	Advantages/ Disadvantages	Application/Use	Image
UTP	Category 3	10 bps	**Advantages** • Cheaper in cost • Easy to install as they have a smaller overall diameter. **Disadvantages** • More prone to (EMI) Electromagnetic interference and noise	10Base-T Ethernet	
	Category 5	Up to 100 Mbps		Fast Ethernet, Gigabit Ethernet	
	Category 5e	1Gbps		Fast Ethernet, Gigabit Ethernet	
STP	Category6,6a	10Gbps	**Advantages** • Shielded. • Faster than UTP. • Less susceptible to noise and interference **Disadvantages** • Expensive • Greater installation effort	Gigabit Ethernet, 10G Ethernet (55m) Widely used in data centres	
SSTP	Category 7	10Gbps		Gigabit Ethernet, 10G Ethernet (100m)	 

Coaxial cable	RG-6 RG-59 RG-11	10-100Mbps	• High bandwidth • Immune to interference • Low loss bandwidth • Versatile • **Disadvantages** • Limited distance • Cost • Size is bulky	Speed of signal is 500m Television network High speed internet connections	
fibre optics cable	Single mode Multi mode	100Gbps	**Advantages** • High speed • High bandwidth • High security • Long distance **Disadvantages** • Expensive • Requires skilled installers	• Maximum distance of fibre optics cable is around 100meters	

b) Make Your Own Ethernet Cross-Over Cable/ Straight cable

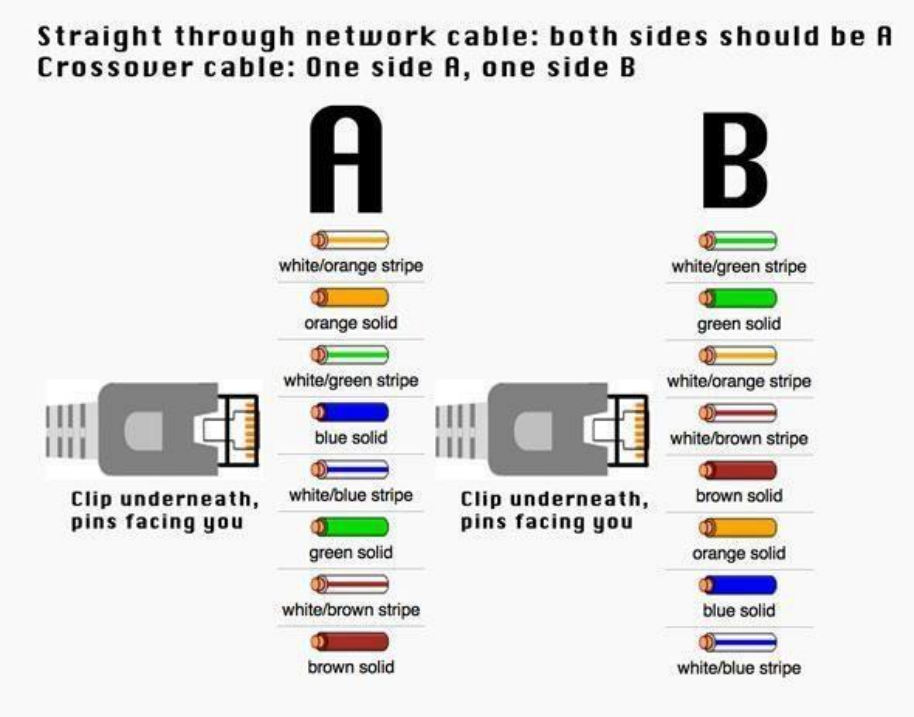
Tools and parts needed:

- Ethernet cabling. CAT5e is certified for gigabit support, but CAT5 cabling works as well, just over shorter distances.
- A crimping tool. This is an all-in-one networking tool shaped to push down the pins in the plug and strip and cut the shielding off the cables.
- Two RJ45 plugs.
- Optional two plug shields.

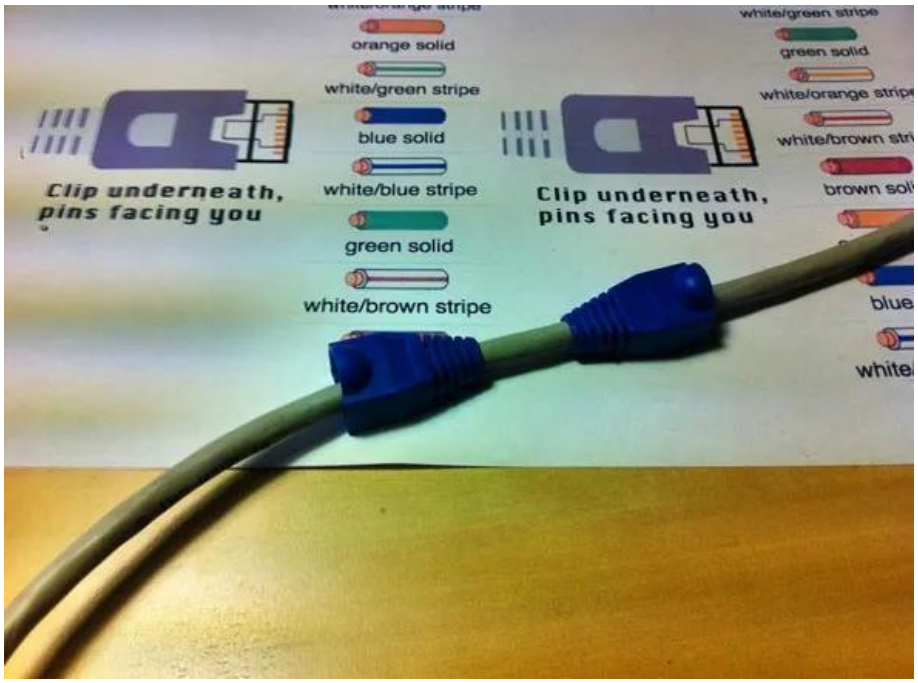


Difference between crossover cable and straight cable

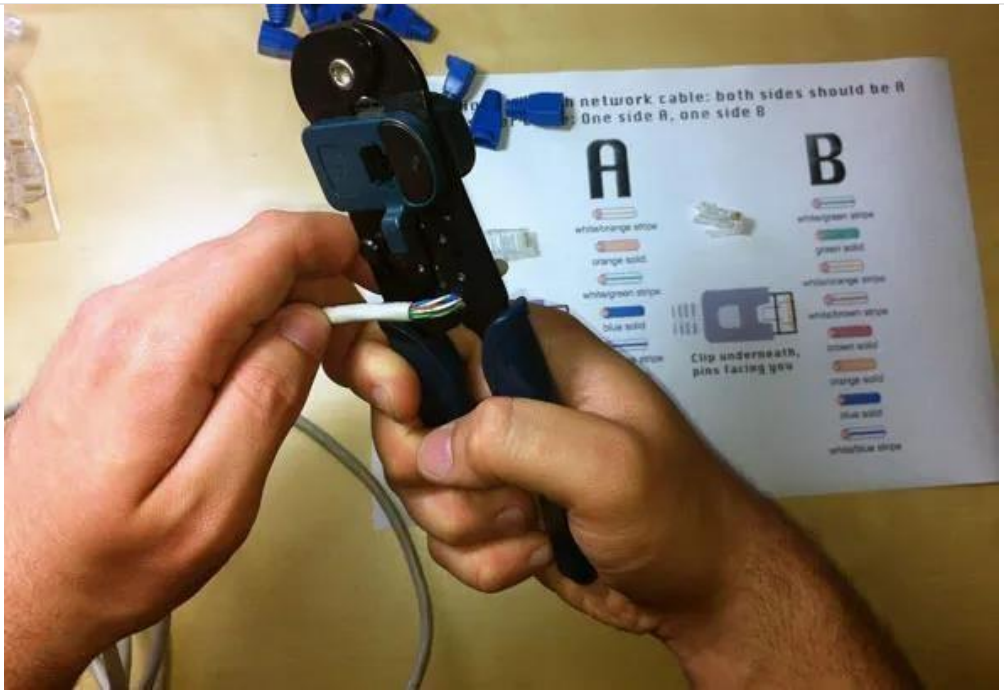
Take a print out the diagram below or have it handy as a reference



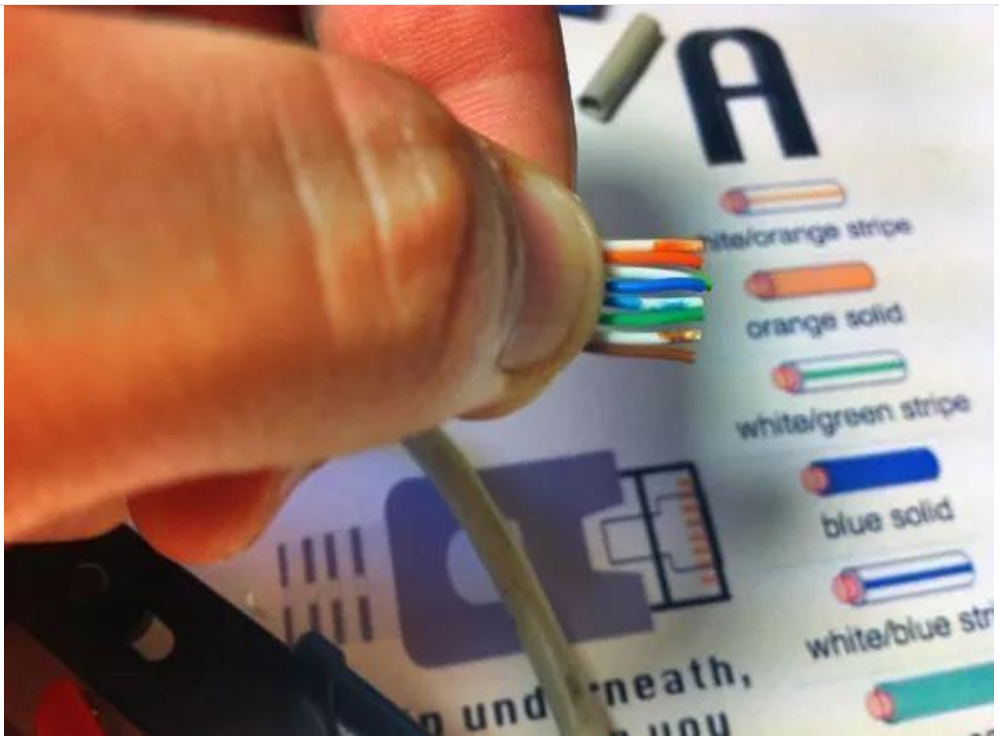
Step 1: To start construction of the device, begin by threading shields onto the cable.



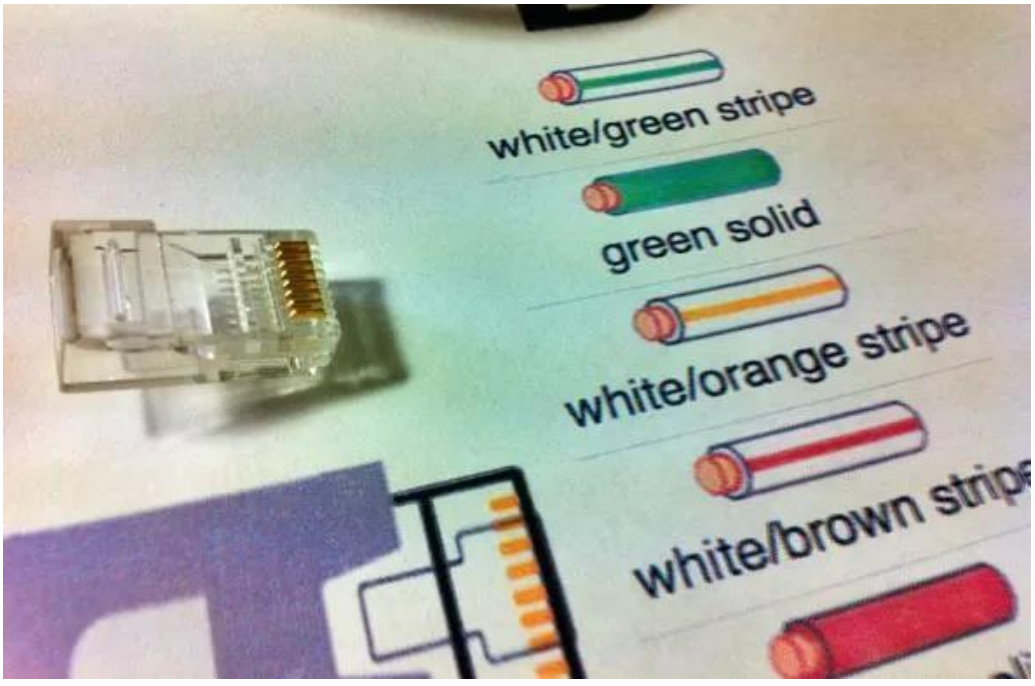
Step 2: Next, strip approximately 1.5 cm of cable shielding from both ends. The crimping tool has a round area to complete this task.



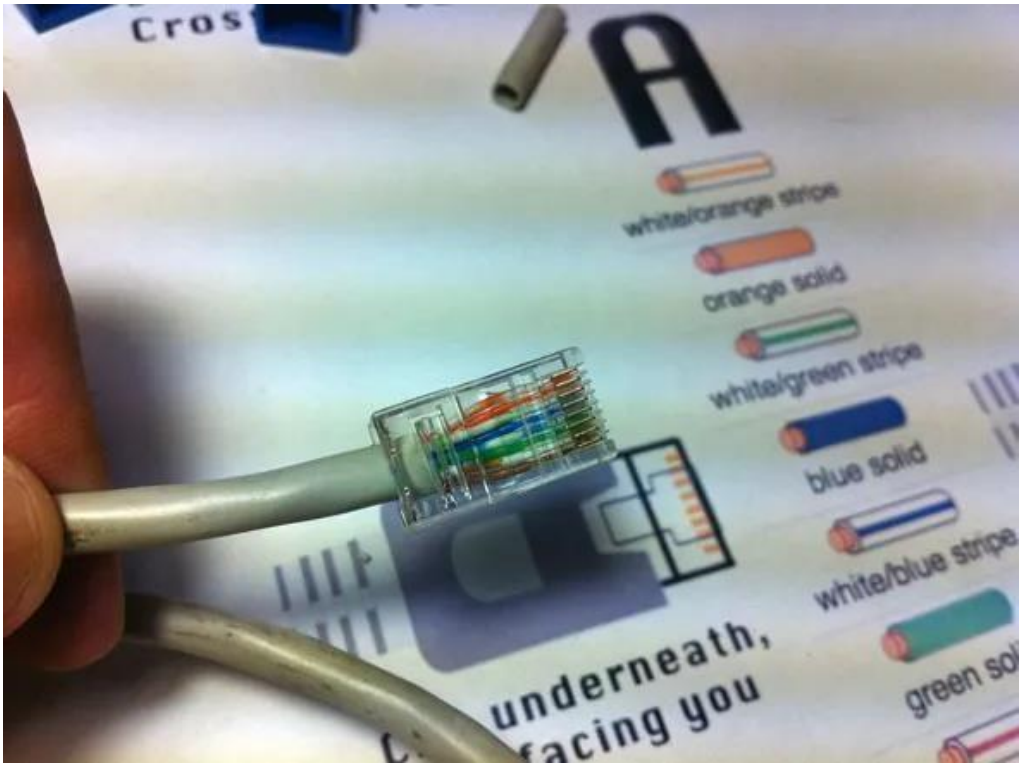
Step 3: After, you will need to untangle the wires; there should be four "twisted pairs." Referencing back to the sheet, arrange them from top to bottom. One end should be in arrangement A and the other in B.



Step 4: Once the order is correct, bunch them together in a line, and if there are any that stick out farther than others, snip them back to create an even level. The difficult aspect is placing these into the RJ45 plug without messing up the order. To do so, hold the plug with the clip side facing away from you and have the gold pins facing toward you, as shown.



Step 5: Next, push the cable right in. The notch at the end of the plug needs to be just over the cable shielding, and if it isn't, that means that you stripped off too much shielding. Simply snip the cables back a little more.



Step 6: After the wires are securely sitting inside the plug, insert it into the crimping tool and push down.
It should be shaped correctly, but pushing too hard can crack the fragile plastic plug.

Step 7: Lastly, repeat for the other end using diagram B (to make a crossover cables)/ using diagram A (to make a straight through cable)

To test it, plug it in and attempt to connect two devices directly.

Student observation:-

1. **What is the difference between cross cable and straight cable?**
2. **Which type of cable is used to connect two PC?(straight/Cross cable)**
3. **Which type cable is used to connect a router/switch to your PC? (straight/Cross cable)**
4. **Find out the category of twisted pair cable used in your la to connect the PC to the network socket.**
5. **Write down your understanding, challenges faced and output received while making a twisted pair cross/straight cable.**

The difference between a cross cable and a straight cable lies in the arrangement of the wires inside the cable. A straight cable has the same wiring sequence on both ends, typically following the T568A or T568B standard, meaning each wire connects to the same pin number on both ends. Straight cables are used to connect different types of devices, such as a computer to a switch or a router, where the transmit and receive lines need to be aligned for communication. On the other hand, a cross cable has one end wired in the T568A standard and the other end in the T568B standard; this means that the transmit and receive pairs are crossed, which is used to directly connect similar devices like two PCs or two switches for data transfer without an intermediary device.

To connect two PCs directly, a cross cable is used because it crosses the transmit and receive signals to enable proper communication between the two similar devices without the need for a switch or router. For connecting a router or switch to a PC, a straight cable is used since these devices operate on different layers, and the transmit and receive lines are aligned accordingly to facilitate communication.

Regarding the twisted pair cables used in your lab environment for connecting PCs to network sockets, these are commonly Category 5e (Cat5e) or Category 6 (Cat6) cables. These categories support speeds ranging from 1 Gbps to 10 Gbps, with Cat6 offering better performance and less interference due to improved shielding and tighter twists. You can confirm the exact category by inspecting the cable sheath, where the category is usually printed.

In making a twisted pair cross or straight cable, the key understanding is the importance of wire color coding and precise crimping to ensure each wire is correctly connected to the corresponding pin on each connector. Challenges often faced include maintaining the correct order of wires, avoiding untwisting the pairs too much which could cause interference, and ensuring the RJ45 connectors are properly crimped for secure contact. Incorrect wiring or poor crimping results in network connectivity issues or no signal transmission. Upon successful wiring, the cable should pass continuity tests using cable testers, and devices connected through the cable should reliably communicate at the intended speed without data loss.