**MANAV RACHNA UNIVERSITY, FARIDABAD**

**Department of Computer Science and Technology**

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**BTECH CSE5C**

**2K19CSUN01082**

**Course: B.Tech. CSE Semester: V Session: July- Dec 2021**

**Subject: COMPUTER NETWORKS** (**CSH 303 T&P)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objective:** The student will learn to install and use the tool for User Experience.

**Course Outcome CO1:** Gain knowledge of various transmission media, their components and devices

**CO2:** Understand the various networks and access techniques at data link layer level

**Blooms Taxonomy Level**: BT1, BT2

**EXPERIMENTS-1 Study of different types of Network cables and practically implements the cross-wired cable and straight through cable using clamping tool.**

Q 1– What are the different types of network cables. Write the working, architecture, advantages and disadvantages of each type. Also differentiate them.

* ***Stranded cable:***   This type of wire is more flexible and it is more applicable for Ethernet cables where the cable may be moved - often it is idea for patch leads at desks or general connections to PCs, etc where some movement may be needed and expected.
* ***Solid cable:***   Solid cable is not as flexible as the stranded type, but it is also more durable. This makes it best for use in permanent installations like cable installations under floors, embedded in walls and the like

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## Categories for Ethernet cables

A variety of different cables are available for Ethernet and other telecommunications and networking applications. These network cables that are described by their different categories, e.g. Cat 5 cables, Cat-6 cables, etc, which are often recognised by the TIA (telecommunications Industries Association) and they are summarised below:

* **Cat-1:**     This is not recognised by the TIA/EIA. It is the form of wiring that is used for standard telephone (POTS) wiring, or for ISDN.
* **Cat-2:**     This is not recognised by theTIA/EIA. It was the form of wiring that was used for 4Mbit/s token ring networks.
* **Cat-3:**     This cable is defined in TIA/EIA-568-B. It is used for data networks employing frequencies up to 16 MHz. It was popular for use with 10 Mbps Ethernet networks (100Base-T), but has now been superseded by Cat-5 cable.
* **Cat-4:**    This cable is not recognised by the TIA/EIA. However it can be used for networks carrying frequencies up to 20 MHz. It was often used on 16Mbps token ring networks.
* **Cat-5:**    This is not recognised by the TIA/EIA. This is the network cable that is widely used for 100Base-T and 1000Base-T networks as it provides performance to allow data at 100 Mbps and slightly more (125 MHz for 1000Base-T) Ethernet. The Cat 5 cable superseded the Cat 3 version and for a number of years it became the standard for Ethernet cabling. Cat 5 cable is now obsolete and therefore it is not recommended for new installations.  
    
  Cat 5 cable uses twisted pairs to prevent internal crosstalk, XT and also crosstalk to external wires, AXT.  
    
  Although not standardised, the Cat 5 cable normally uses 1.5 - 2 twists per centimetre.
* **Cat-5e:**    This form of cable is recognised by the TIA/EIA and is defined in TIA/EIA-568, being last revised in 2001. It has a slightly higher frequency specification that Cat-5 cable as the performance extends up to 125 Mbps.  
    
  Cat-5e can be used for 100Base-T and 1000Base-t (Gigabit Ethernet). Cat 5e standard for Cat 5 enhanced and it is a form of Cat 5 cable manufactured to higher specifications although physically the same as Cat 5. It is tested to a higher specification to ensure it can perform at the higher data speeds. The twisted pairs within the network cables tend to have the same level of twisting as the Cat 5 cables.
* **Cat-6:**    This cable is defined in TIA/EIA-568-B provides a significant improvement in performance over Cat5 and Cat 5e. During manufacture Cat 6 cables are more tightly wound than either Cat 5 or Cat 5e and they often have an outer foil or braided shielding. The shielding protects the twisted pairs of wires inside the Ethernet cable, helping to prevent crosstalk and noise interference. Cat-6 cables can technically support speeds up to 10 Gbps, but can only do so for up to 55 metres - even so this makes them relatively long Ethernet cables.  
    
  The Cat 6 Ethernet cables generally have 2+ twists per cm and some may include a nylon spline to reduce crosstalk, although this is not actually required by the standard.
* **Cat-6a:**    The “a” in Cat 6a stands for “Augmented” and the standard was revised in 2008. The Cat 6a cables are able to support twice the maximum bandwidth, and are capable of maintaining higher transmission speeds over longer network cable lengths. Cat 6a cables utilise shielded which is sufficient to all but eliminate crosstalk. However this makes them less flexible than Cat 6 cable.
* **Cat-7:**    This is an informal number for ISO/IEC 11801 Class F cabling. It comprises four individually shielded pairs inside an overall shield. It is aimed at applications where transmission of frequencies up to 600 Mbps is required.
* **Cat-8:**    Cat 8 cables have now been released and provide a huge step up in data rate / bandwidth. Accordingly these Cat 8 cables are geenrally more expensive than the older versions like Cat 6, or even Cat 7.

Further descriptions of Cat-5 and Cat-5e cables are given below as these are widely used for Ethernet networking applications today.

| **ETHERNET CABLE PERFORMANCE SUMMARY** | | | |
| --- | --- | --- | --- |
| **CATEGORY** | **SHIELDING** | **MAX TRANSMISSION SPEED (AT 100 METERS)** | **MAX BANDWIDTH** |
| Cat 3 | Unshielded | 10 Mbps | 16 MHz |
| Cat 5 | Unshielded | 10/100 Mbps | 100 MHz |
| Cat 5e | Unshielded | 1000 Mbps / 1 Gbps | 100 MHz |
| Cat 6 | Shielded or Unshielded | 1000 Mbps / 1 Gbps | >250 MHz |
| Cat 6a | Shielded | 10000 Mbps / 10 Gbps | 500 MHz |
| Cat 7 | Shielded | 10000 Mbps / 10 Gbps | 600 MHz |
| Cat 8 | Shielded | 25 Gbps or 40Gbps **\*** | 2000 MHz |

**\*** 25 Gbps for Cat 8.1 and 40 Gbps for Cat 8.2.

Q 2 – Write down the steps to make a crossover cable.

* **Find a standard Ethernet cable you don't use for anything.** With this guide, you will be able to use a long 100 feet (30.5 m). cable, or a shorter size, whatever your needs require.

* **Towards one end of the cable, cut open a slit a few inches long.** Be careful not to damage the wiring inside the cable or cut yourself.
* **Peel back and remove the cable casing.** This will leave the inner wiring exposed. Examine how the wiring is twisted together and note the colors of the wires. For this project, we will be cutting the colored wires (green, orange, white-green, white-orange) and leaving the other wires in place as usual.

* **Cut the green, orange, white-green and the white-orange.** The other wires will be left as-is.

* **With the wires cut, work now one-by-one.**
  + First, strip the orange wire on both cut sides down. (approx. 1/4 or 1/2 inch)
  + After both ends of the orange wire has been stripped, strip both ends of the green wire down. (approx. 1/4 or 1/2 inch)

* **On Side "A" we will call it, connect the green stripped end to the orange stripped end on Side "B".** Twist the wires together, and mend with electrical or another kind of tape. If you have a soldering iron, you can optionally solder the leads together.

* **You now have one step of your crossover wire completed.** Lets continue on.

* **Just as we connected the orange and green wires for one side of our crossover cable, lets now repeat the process with the final two wires.**
  + Start by stripping the green-white wires. (once again, approx. 1/4 or 1/2 inch)
  + Repeat the wire stripping on orange-white wires. (once again, approx. 1/4 or 1/2 inch)

* **On Side "A", join the green-white wire to the orange-white wire on Side "B".** Twist the wires together and fix with tape. Again, if you prefer, you can solder the wires together as opposed to twisting them together.

* **Join the remaining wires.** Join the orange-white wire on Side "A", with the green-white wire on Side "B". Fashion the wires with tape or solder.

* **Clean the cable up.**
  + Note the direction that the wiring in the cable case is twisting.
  + Holding the cable in your hands, *twist* the cable in the same way as the internal wiring is twisted.
  + Keep the wire twisted, and close it up with tape or shrink-wrap.

* **Admire your new, home made crossover cable!**

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Q 3 – Write down the steps to connect two computers.

**Step 1:**Connect two Computers using an ethernet cable.

**Step 2:**Click on *Start->Control Panel->Network and Internet->Network and Sharing Center.*

**Step 3:**Click on option *Change Adapter Setting* in the upper-left side of the window.

**Step 4:**Select both the Wi-Fi connection and the Ethernet connection and Right-click the Wi-Fi connections.

**Step 5:**Click on *Bridge Connections*. After some time your computer’s Wi-Fi will be shared with the other computer.

**Link: https://www.youtube.com/watch?v=\_NX99ad2FUA**