

Cabling

Objectives:

1. Distinguishing between different kinds of cabling media and their usage.
2. Making straight through and crossover cable.
3. Usage of punching-down tool.
4. Usage of a cable tester to verify that a straight through or a crossover is good or bad.

Equipment:

1. Cables
2. Crimping tools
3. Punch-down tools
4. Cable cutter
5. Cable tester

Background:

In this lab, you are going to learn how to build a straight through and crossover cables. You will test the cable and correct the errors.

a. Straight Through Cable: It is use for connecting computers to a hub. In this type of cable, wires 1,2,3 and 6 at the one end of the cable are also wires 1,2,3 and 6 at the other end.

b. Crossover Cable: I is used for connecting a hub to another hub. In this type of cable, the order of the wires changes from one end to the other. The wire 1 becomes 3 and 2 becomes 6.

c. Category 5: Unshielded twisted pair with 100 ohm impedance and electrical characteristics supporting transmission at frequencies up to 100 MHz. Defined by the TIA/EIA 568-a specification. It may be used with 10Base-T, 100Base-T4, 100Base-T2, and 100Base-TX. It may support 1000Base-T, but cable should be tested to make sure it

meets 100Base-T specifications. It can be punched and crimped as either straight through or crossed. It has 8 thin, color-coded wires inside that run from one end of the cable to the other. Ethernet networks for connection use only wires 1,2,3 and 6.

d. Cable test: We test the cable to verify that a straight through or crossover cable is good or not. We test the wire map to identify insulation-wiring errors. We test the length of the cable. We test if there is Near End Cross talk (NEXT), which shows the electromagnetic field effects that cause interference between the adjacent wires. The faults that we may identify by testing the cable and their likely causes are explained below.

Wire map indicates the following:

- Proper pin termination at each end.
- Continuity to the remote end.
- Shorts between any two or more conductors.
- Crossed pairs
- Reversed pairs
- Split pairs
- Any other miswires.

The Figure 1 shows the correct connectivity and Figure 2 shows the reversed pairs, crossover pairs and split pairs.

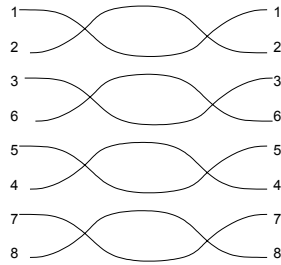


Figure 1. Correct connectivity

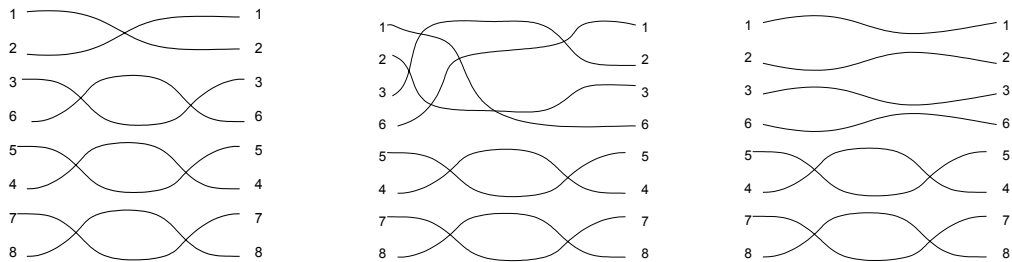


Figure 2. Reversed pairs, crossover pairs and split pairs

Reverse pair occurs when the polarity of one wire pair is reversed at one end of the link. Crossover pair occurs when the two conductors in a wire pair are connected to the position for a different pair at the remote connector. Split pairs occur when pin-to-pin continuity is maintained but physical pairs are separated.

Experiment:

1. Building a straight through cable:

Typical CAT5 UTP cables contain 4 pairs made up of a solid color and the same solid color striped onto a white background. The pairs are as follows:

- Wire Pair 1: White-Blue / Blue
- Wire Pair 2: White-Orange / Orange
- Wire Pair 3: White-Green / Green
- Wire Pair 4: White-Brown / Brown

We order the wires in the cable in certain order. The table below gives the order of the wires.

Pin 1	White/Orange
Pin 2	Orange
Pin 3	White/Green
Pin 4	Blue
Pin 5	White/Blue
Pin 6	Green
Pin 7	White/Brown
Pin 8	Brown

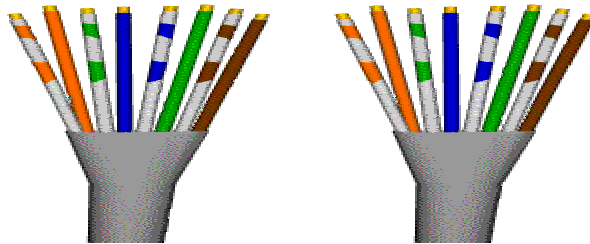


Figure 3. The table of the color order and its illustration.

After ordering the wires, we insert it into the RJ45, the connector.

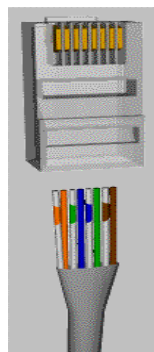


Figure 4. Inserting the wires into the RJ45 connector.

After inserting the wires inside the connector, they should look like this:

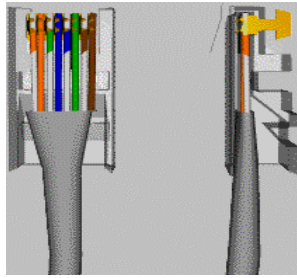


Figure 5. The front and side view of the connector

We place the connector into the crimper and squeeze it.

The both ends of the cable have the same color order in straight through cable.

Return the straight through cable you make to the instructor.

2. Building a crossover cable:

We obtain a crossover cable by reversing the some pins on one end of the cable. The Color order is given in the table below.

Pin 1	White/Green
Pin 2	Green
Pin 3	White/Orange
Pin 6	Blue
Pin 5	White/Blue
Pin 6	Orange
Pin 7	White/Brown
Pin 8	Brown

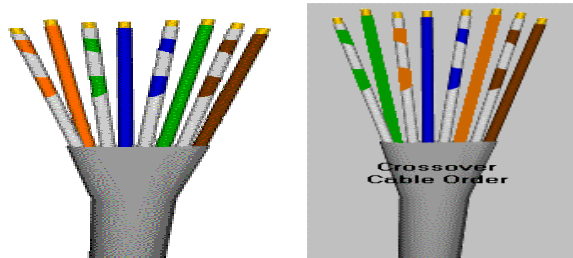


Figure 6. The order of Crossover Cable

As we see in the table, we need to make a cable where pins 1 & 2 from one end are connected to pins 3 & 6 on the other end, and pins 3 & 6 from the first end are connected to pins 1 & 2 on the other end. Pins 4 & 5 and 7 & 8 are unchanged.

Return the crossover cable you make to the instructor.

3. Punching down the cables to the patch panel:

Strip the jacket off of one end of the cable. Place the each wire to patch panel according to the color appears on the panel. Push the wire back by using punch-down tool.

4. Testing the cable:

In order to test the cable, follow the steps below:

-Using the Main tester unit/Transmitter, place the one end of the cable into “TX/Remote” and the other end “RX/Loop Back”.

-Set the power switch ON/TONE.

Auto Scan Mode:

-Select Auto Test mode.

-When in Auto Scan mode, the LED in the TX row will scroll in sequence (1, 2...Shield/GRN and repeat), to indicate the pins being tested. The RX row of LED will light (or not), in relation to the TX row, to indicate status.

Manual Scan Mode:

-Press the TEST Button to change the tester mode from “Auto” to “Manual”.

-The TX row of LED will hold and flash to indicate the pin being tested. The RX row of LED will light (or not), in relation to the TX row, to indicate status. Any subsequent press of the “TEST” button will advance the LED to the next one in sequence (1, 2...Shield/GRN and repeat).

LED Status:

When combining the information indicated by the RX and TX LEDs, a cable pin-to-pin configuration can be determined.

-The LED pair that is light at the same time indicates which pins are connected.

-If more than one LED from the same row is lit or if TX & RX LEDs are unlit simultaneously- this indicates a “short”.

-If a LED is skipped- this may indicate an “open”.

Cabling

Test the given cables and fill the worksheet according to your observations of the cable pin configuration. Identify the type of cable (straight through or crossover) and the cable failures (short, open, reverse, miss-wire... etc.).

Cable 1:

Cable No:	Comments:
Pin 1 -	
Pin 2 -	
Pin 3 -	
Pin 4 -	
Pin 5 -	
Pin 6 -	
Pin 7 -	
Pin 8 -	

Cable 2:

Cable No:	Comments:
Pin 1 -	
Pin 2 -	
Pin 3 -	
Pin 4 -	
Pin 5 -	
Pin 6 -	
Pin 7 -	
Pin 8 -	

Cable 3:

Cable No:	Comments:
Pin 1 -	
Pin 2 -	
Pin 3 -	
Pin 4 -	
Pin 5 -	
Pin 6 -	
Pin 7 -	
Pin 8 -	

Cable 4:

Cable No:

Comments:

Pin 1 -

Pin 2 -

Pin 3 -

Pin 4 -

Pin 5 -

Pin 6 -

Pin 7 -

Pin 8 -

Cable 5:

Cable No:

Comments:

Pin 1 -

Pin 2 -

Pin 3 -

Pin 4 -

Pin 5 -

Pin 6 -

Pin 7 -

Pin 8 -