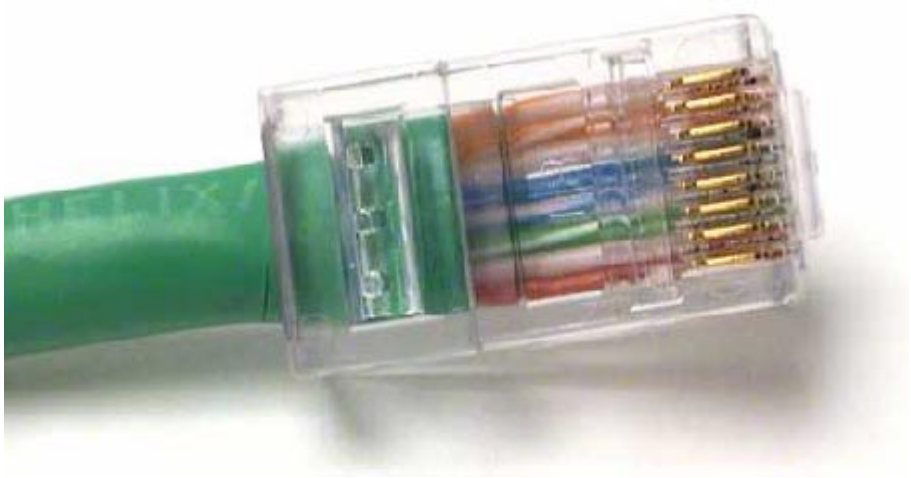
Lab 3.1.9c Straight-Through Cable Construction



Objective

- Build a Category 5 or Category 5e Unshielded Twisted Pair (UTP) Ethernet network patch cable or patch cord.
- Test the cable for continuity and correct pinouts, the correct color of wire on the right pin.

Background

The cable constructed will be a four-pair, eight-wire, straight-through cable, which means that the color of wire on Pin 1 on one end of the cable will be the same as that of Pin 1 on the other end. Pin 2 will be the same as Pin 2, and so on. The cable will be wired to either TIA/EIA T568B or T568A standards for 10BASE-T Ethernet, which determines what color wire is on each pin. T568B, also called AT&T specification, is more common in the U.S., but many installations are also wired to T568A, also called ISDN.

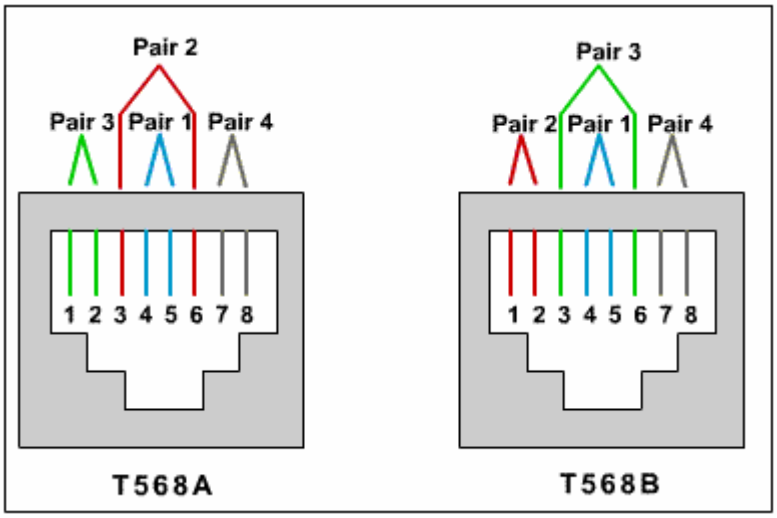
Prior to starting the lab, the teacher or lab assistant should have a spool of Category 5 Unshielded Twisted Pair (UTP) cable, RJ-45 (8-pin) connectors, an RJ-45 crimping tool and an Ethernet / RJ-45 continuity tester available. Work individually or in teams. The following resources will be required:

- One 0.6 to .9 m (2 to 3 ft) length of Category 5 cabling per person or team
- Four RJ-45 connectors, two are extra for spares
- RJ-45 crimping tools to attach the RJ-45 connectors to the cable ends
- Ethernet cabling continuity tester which can test straight-through or crossover type cables, T568A or T568B
- Wire cutters

Cabling Pin-out Information for T568B

Pin #	Pair #	Function	Wire Color	Used with 10/100BASE-T Ethernet?	Used with 100BASE-T4 and 1000BASE-T Ethernet?
1	2	Transmit	White/Orange	Yes	Yes
2	2	Transmit	Orange	Yes	Yes
3	3	Receive	White/Green	Yes	Yes
4	1	Not used	Blue	No	Yes
5	1	Not used	White/Blue	No	Yes
6	3	Receive	Green	Yes	Yes
7	4	Not used	White/Brown	No	Yes
8	4	Not used	Brown	No	Yes

Diagram showing both T568A and T568B cabling wire colors



Use the preceding table and diagram to create a T568B patch panel cable. Both cable ends should be wired the same when looking at the conductors.

Step 1

Determine the distance between devices or device and plug. Add at least 30.48 cm (12 in.) to the distance. The maximum length for this cable, according to TIA/EIA structured wiring standards is 5 m (16.4 ft), although this can vary. Standard lengths are 1.83 m (6ft) and 3.05 m (10 ft).

Step 2

Cut a piece of stranded Category UTP cable to the desired length. Use stranded cable for patch cables because it is more durable when bent repeatedly. Solid wire is used for cable runs that are punched down into jacks.

Step 3

Strip 5.08 cm (2 in.) of jacket off of one end of the cable.

Step 4

Hold the four pairs of twisted cables tightly where jacket was cut away. Reorganize the cable pairs into the order of the T568B wiring standard. Take care to maintain as much of the twists as possible since this provides noise cancellation.

Step 5

Hold the jacket and cable in one hand and untwist a short length of the green and blue pairs. Reorder the pairs to reflect the T568B wiring color scheme. Untwist and order the rest of the wire pairs according to the color scheme.

Step 6

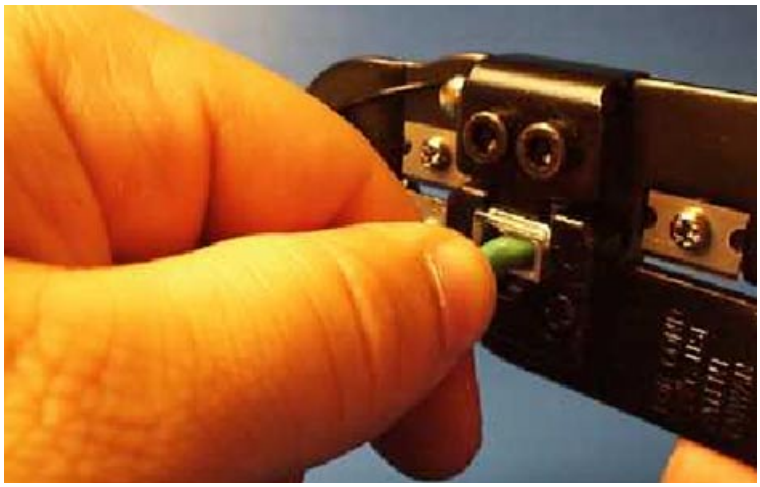
Flatten, straighten, and line up the wires. Trim them in a straight line to within 1.25 to 1.9 cm (1/2 to ¾ in.) from the edge of the jacket. Be sure not to let go of the jacket and the wires, which are now in the proper order. Minimize the length of untwisted wires because sections that are too long and near connectors are a primary source of electrical noise.

Step 7

Place an RJ-45 plug on the end of the cable, with the prong on the underside and the orange pair to the left side of the connector.

Step 8

Gently push the plug onto wires until the copper ends of the wires can be seen through the end of the plug. Make sure the end of the jacket is inside the plug. This provides for stress relief and to ensure that all wires are in the correct order. If the jacket is not inside the plug, the plug will not be properly gripped and will eventually cause problems. If everything is correct, crimp the plug hard enough to force the contacts through the insulation on the wires, completing the conducting path.



Step 9

Repeat Steps 3 through 8 to terminate the other end of the cable. Use the same scheme to finish the straight through cable.

Step 10

Test the finished cable. Have the instructor check the finished cable. How is it possible to tell if the cable is functioning properly?

There is a simple method to check if the cable is functioning that does not require any specialized testing hardware. Find an existing connection that uses a straight through cable, for example between a router and a switch, and replace the existing cable with the new cable. Once you have replaced the cable, check the switch and router for connection lights. Since the switch light can be green, but the connection may still not be working, check that the router Ethernet interface is up. Also, use an extended ping from the router Ethernet IP address to the switch management IP address.

If you have a Fluke 620, the wiring can be tested for connectivity, mapped for correct placement of wires, and confirmed for length. If you have a more basic cable tester, it may simply tell you that the wire passes a connectivity test or not. Some other testers may do slightly more and check each pair of wires for connectivity.

At times, a simple visual inspection can lead to the discovery of an incorrect wiring color pattern or wiring that is incorrectly fit into the connector.

