Lab 3.1.9e Crossover Cable Construction

Objective

- Build a Category 5 or Category 5e Unshielded Twisted Pair (UTP) Ethernet crossover cable to T568B and T568A standards.
- Test the cable for continuity and correct pin-outs, correct wire on the right pin.

Background

This will be a 4-pair "crossover" cable. A crossover cable means that the second and third pairs on one end of the cable will be reversed on the other end. The pin-outs will be T568A on one end and T568B on the other end. All 8 conductors (wires) should be terminated with RJ-45 modular connectors.

This crossover cable will conform to the structured cabling standards. If the crossover cable is used between hubs or switches, it is considered to be part of the "vertical" cabling. Vertical cabling is also called backbone cabling. A crossover cable can be used as a backbone cable to connect two or more hubs or switches in a LAN, or to connect two isolated workstations to create a mini-LAN. This will allow the connection of two workstations or a server and a workstation without the need for a hub between them. This can be very helpful for training and testing. To connect more than two workstations, a hub or a switch will be needed.

Prior to starting the lab, the teacher or lab assistant should have a spool of Category 5 or Category 5e UTP cable, RJ-45 (8-pin) connectors, a 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 crossover type cables, T568A to T568B
- Wire cutters

Step 1

Create a crossover cable using the following tables and diagrams. One end of the cable should be wired to the T568A standard. The other end should be wired to the T568B standard. This crosses the transmit pairs and the receive pairs, the second and third pair, to allow communication to take place.

Only four wires are used with 10BASE-T or 100BASE-TX Ethernet.

T568A Cabling

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

T568B Cabling

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

Step 2

Determine the distance between devices, or device and plug, and then add at least 30.48 cm (12 in.) to it. Standard lengths for this cable are 1.83 m (6 ft) and 3.05 m (10 ft).

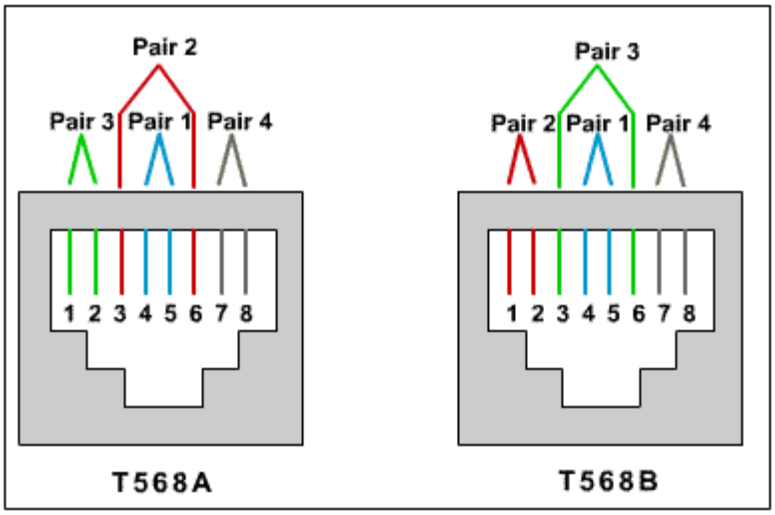
Step 3

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

Step 4

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

Diagram showing both T568A and T568B cabling wire colors



Step 5

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

Step 6

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

Step 7

Flatten, straighten, and line up the wires. Trim them in a straight line to within 1.25 cm 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 order. Minimize the length of untwisted wires because sections that are too long and near connectors are a primary source of electrical noise.

Step 8

Place an RJ-45 plug, prong down, on the end of the cable with the green pair on the left side of the T568A end, and the orange pair on the left side of the T568B end.

Step 9

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 and 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, thus completing the conducting path.

Step 10

Repeat steps 4-9 to terminate the other end of the cable using the **T568A** scheme to finish the crossover cable.

Step 11

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

