

# Constructing Twisted Pair Ethernet Cables

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## I. Terms and Specifications

### A. Twisted Pair Cables are used in 10BaseT and 100BaseT Ethernet Systems

1. BaseT stands for Twisted Pair (Base2 is Coaxial, Base5 is AUI)

2. Category Levels (called “cat” for short)

a. Currently range from 1-6

1) 1-3 is just for telephone use

2) 4 is for 10Mb or slower

3) 5 is for 100Mb (Fast Ethernet) or slower

4) 6 is for Gigabit Ethernet

b. Levels correspond roughly to Cat standards, but are different

### B. All of the wiring spec is outlined by EIA/TIA

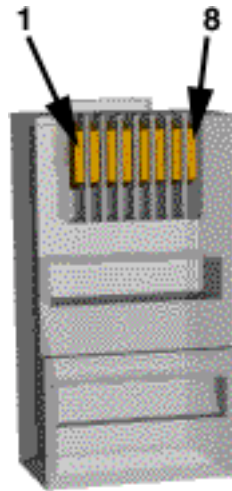
1. Electronic Industry Association/Telecommunications Industry Association

## II. EIA/TIA

### A. Connectors used are RJ45

1. RJ – stands for registered jack

2. 45 – is the pin configuration and spacing



### B. Cabling

1. CAT5 or higher for 100BaseT

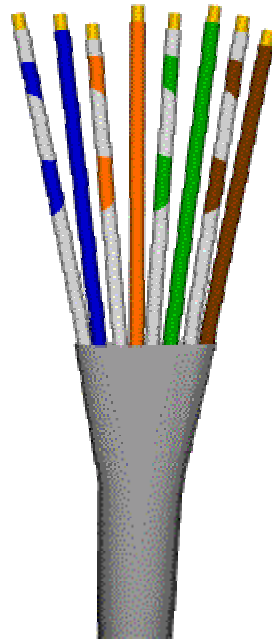
2. Stranded or Solid core

3. Usually 8 conductor, where 2 conductors are twisted into a pair – “twisted pair”, 4 sets

### C. 568B Code

1. A and B Codes (just different ordering standards – same function)

2. B Code: White-Blue, Blue, White-Orange, Orange, White-Green, Green, White-Brown, Brown



### III. Standard Patch Cables (Straight Through)

A. Used for connecting the computer to the hub or switch

B. Wiring for Connector #1

1. Strip outer insulation
2. Check for damage to individual conductors
3. Untwist pairs and straighten
4. Start with 568B standard order
5. Swap 4 and 6 (orange and green)
6. Cut wires in order so that the conductors are a little under 3/4" beyond the outer insulation
7. Slide into RJ45 Connector
8. Verify order in connector since cables can slip
9. Crimp

B. Wiring for Connector #2

1. Repeat process for Connector #1

C. This creates a cable that has a 1 to 1 (2 to 2, etc) mapping giving the name "straight-through"

Function	Color	Pin#		Pin#	Color	Function
TX+	White-Blue	1	<----->	1	White-Blue	TX+
TX-	Blue	2	<----->	2	Blue	TX-
RX+	White-Orange	3	<----->	3	White-Orange	RX+
Unused	Green	4	<----->	4	Green	Unused
Unused	White-Green	5	<----->	5	White-Green	Unused
RX-	Orange	6	<----->	6	Orange	RX-
Unused	White-Brown	7	<----->	7	White-Brown	Unused
Unused	Brown	8	<----->	8	Brown	Unused

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STRAIGHT THROUGH CABLE

#### IV. Cross-link or Uplink Cables

- A. Used for connecting two hubs or switches together, used for connecting two computers together
  - 1. Any like device typically gets connected with a cross-link cable
- B. Wiring for Connector #1 (same as in straight through cable)
  - 1. Strip outer insulation
  - 2. Check for damage to individual conductors
  - 3. Untwist pairs and straighten
  - 4. Start with 568B standard order
  - 5. Swap 4 and 6 (orange and green)
  - 6. Cut wires in order so that the conductors are a little under 3/4" beyond the outer insulation
  - 7. Slide into RJ45 Connector
  - 8. Verify order in connector since cables can slip
  - 9. Crimp
- B. Wiring for Connector #2
  - 1. Strip outer insulation
  - 2. Check for damage to individual conductors
  - 3. Untwist pairs and straighten
  - 4. Start with 568B standard order
  - 5. Swap 4 and 6 (orange and green)
  - 6. Swap 1 and 3 (white-blue and white-orange)
  - 7. Swap the new 2 and 6 (blue and orange)
  - 8. Cut wires in order so that the conductors are a little under 3/4" beyond the outer insulation
  - 9. Slide into RJ45 Connector
  - 10. Verify order in connector since cables can slip
  - 11. Crimp
- C. This creates a cable that has the transmission and reception pairs connected together on either side of the cable, giving this cable its name "cross-link"

Function	Color	Pin#		Pin#	Color	Function
TX+	White-Blue	1	<----->	1	White-Orange	RX+
TX-	Blue	2	<----->	2	Orange	RX-
RX+	White-Orange	3	<----->	3	White-Blue	TX+
Unused	Green	4	<----->	4	Green	Unused
Unused	White-Green	5	<----->	5	White-Green	Unused
RX-	Orange	6	<----->	6	Blue	TX-
Unused	White-Brown	7	<----->	7	White-Brown	Unused
Unused	Brown	8	<----->	8	Brown	Unused

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CROSS-LINK CABLE

#### V. Miscellaneous Info

- A. The color code and the 568B spec really do not matter when making patch cables, just as long as the order of the conductors is correct. But it doesn't hurt to go by the code.
- B. Maximum 100BaseT run length is 100 meters

[Note: The manner, techniques, and sequences are simply what works for me. As you make enough cables you may begin to create your own technique that is even more cool.]