

## Twisted Pair Facts

Twisted pair cables support a wide variety of fast, modern network standards. Twisted pair cabling is composed of the following components:

- Two wires that carry the data signals (one conductor carries a positive signal; one carries a negative signal). They are made of 22 or 24 gauge copper wiring.
- PVC or plenum plastic insulation surrounds each wire. Plenum cable is fire resistant and non-toxic; it must be used when wiring above ceiling tiles. PVC cable cannot be used to wire above ceilings because it is toxic when burned.
- Two wires are twisted to reduce the effects of Electromagnetic Interference (EMI) and crosstalk. Because the wires are twisted, EMI should affect both wires equally and can be cancelled out.
- Multiple wire pairs are bundled together in an outer sheath. Twisted pair cables use RJ-45 connectors and can be classified according to the makeup of the outer sheath:
  - Shielded Twisted Pair (STP) has a grounded outer copper shield around the bundle of twisted pairs or around each pair. This provides added protection against EMI.
  - Unshielded Twisted Pair (UTP) does not have a grounded outer copper shield. UTP cables are easier to work with and are less expensive than shielded cables.

Twisted pair cable has the following advantages and disadvantages:



<b>Advantages</b>	<ul style="list-style-type: none"><li>• Inexpensive compared to other media types</li><li>• Easy to install and manage</li><li>• Very common (media and tools are easy to obtain)</li></ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"><li>• Most susceptible to EMI of all the media types</li><li>• Cables are more easily damaged than other types</li></ul>

The table below describes the different unshielded twisted pair (UTP) cable types (categories).

Type	Connector	Description
Phone cable	RJ-11	Used to connect a modem to a phone jack in a wall outlet to establish a dial-up Internet connection Has two pairs of twisted cable (a total of 4 wires)
Cat 3	RJ-45	Designed for use with 10 megabit Ethernet or 16 megabit token ring
Cat 5	RJ-45	Supports 100 megabit and 1 gigabit Ethernet and ATM networking
Cat 5e	RJ-45	Similar to Cat 5 but provides better EMI protection. Supports 1 and 10 gigabit Ethernet (gigabit connections require the use of all four twisted pairs)
Cat 6	RJ-45	Supports high-bandwidth, broadband communications

**Note:** While Category 3 and Category 5 cabling may appear similar physically, they are electrically different. Category 5 cabling is twisted much tighter than Category 3 cabling. This reduces cross talk and enables Category 5 wiring to support much faster data transmission rates.

The table below describes the two types of connectors used with twisted pair cables.

Connector	Description
<p>RJ-11</p> 	<ul style="list-style-type: none"><li>• Has 4 connectors</li><li>• Supports up to 2 pairs of wires</li><li>• Uses a locking tab to keep connector secure in outlet</li><li>• Used primarily for telephone wiring</li></ul>
<p>RJ-45</p> 	<ul style="list-style-type: none"><li>• Has 8 connectors</li><li>• Supports up to 4 pairs of wires</li><li>• Uses a locking tab to keep connector secure in outlet</li><li>• Used for Ethernet and some token ring connections</li></ul>

**Note:** You should use a crimping tool to attach connectors to UTP cable.

Each type of UTP cable can be substituted for any category below it, but never for a category above. For example, Cat 6 can be substituted for a task requiring Cat 5e; however, neither Cat 5 nor Cat 3 should be used for this particular task.