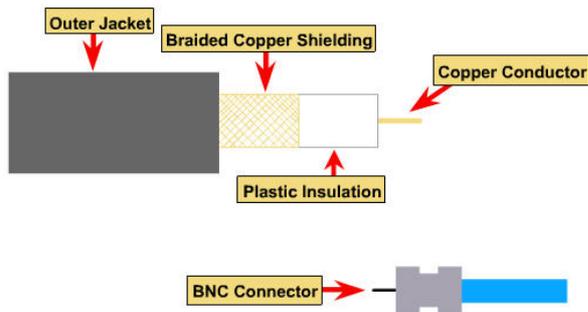


## Cat 3, Cat 5, fiber optic, UTP, and STP

### Coaxial Cable

Coaxial cable is braided-grounded strands of wire that can provide some shielding and noise immunity; however, the installation and the termination of the cable itself can be costly. Coaxial cabling, which uses connectors called BNC (Bayonet Nut Connector) is known as, in forms of Ethernet, thicknet and thinnet, in the older LAN technology, ARCnet, and cable TV.

### Coaxial Cable



- ◆ Speed and throughput: 10 - 100 Mbps
- ◆ Average \$ per node: Inexpensive
- ◆ Media and connector size: Medium
- ◆ Maximum cable length: 500m (medium)

### 10BASE2 50 Ohm Coax Cable



### Cat 3 UTP and STP

Category 3 UTP and STP (Cat 3) include applications as voice (telephony) or data (up to 10 Mbps). More commonly Cat 3 is used on a networks for cable segments to workstations or printers. Cat 3 is not recommended for data installations since its maximum bandwidth of 10Mbps is rapidly being exceeded by many LAN technologies.

### Category 5 UTP and STP

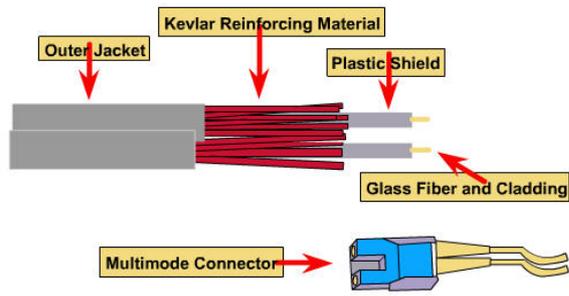
Applications for Category 5 UTP and STP include voice (telephony) or data (up to 100 Mbps, or with certain technologies, 1000 Mbps). Cat 5 is sometimes used as a backbone; however is restricted to 100 meters in length. It is currently the most popular cabling for connecting workstations and horizontal cable runs due to its low cost, high bandwidth, relative ease of installation, and ease of termination with RJ-45 connectors.

### Fiber Optic

Fiber optic cabling carries signals, which have been converted from electrical to optical (pulses of light) form. It consists of the core, either an extremely thin cylinder of glass or optical quality plastic, which is surrounded by a second glass or plastic layer called the cladding. The interface between the core and cladding can trap light signals by a process called Total Internal Reflection (TIR), resulting in the optical fiber acting as a light pipe. Protective buffer and jackets materials are used to cover the cladding layer. This type of cabling is less frequently used because it is somewhat more expensive; however, it is rapidly decreasing in both raw cost and installed cost.

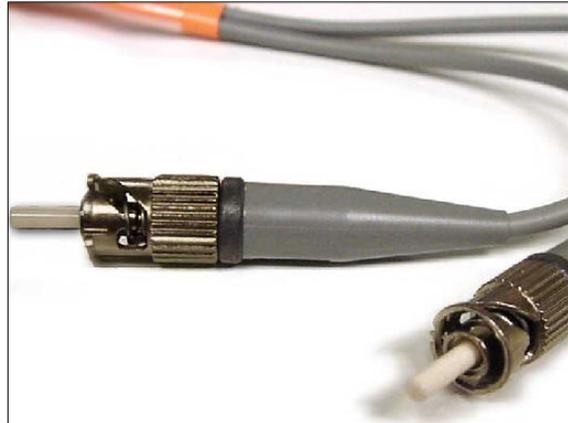
Fiber optic cables are not susceptible to interference, such as radio waves, fluorescent lighting, or any other source of electrical noise. It is the common cable used for network backbones and can support up to 1000 stations, carrying signals beyond 25 km. Fiber terminations include SC, ST, and a variety of proprietary connectors. Maximum data transfer rate is virtually limitless: tens and hundreds of gigabits per second, limited only by the electronics on each end of the fiber.

## Fiber Optic Cable



- ◆ Speed and throughput: 100+ Mbps
- ◆ Average \$ per node: Most Expensive
- ◆ Media and connector size: Small
- ◆ Single mode, maximum cable length: Up to 3000m
- ◆ Multimode mode, maximum cable length: Up to 2000m
- ◆ Single mode: One stream of laser-generated light
- ◆ Multimode: Multiple streams of LED-generated light

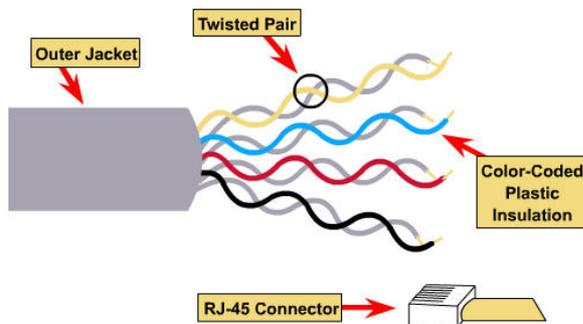
## Fiber Optic Cable Connectors



## Unshielded Twisted Pair (UTP)

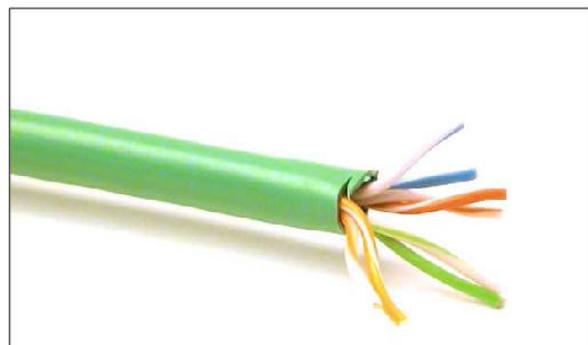
Unshielded Twisted Pair (UTP) is a set of three or four pairs of wires with each wire in each pair twisted around the other to prevent electromagnetic interference. UTP cabling uses RJ-45, RJ-11, RS-232, and RS-449 connectors. Because it is less expensive and easier to install, UTP is more popular than Shielded Twisted Pair (STP) or Coaxial Cabling. An example of UTP application is telephone networks, which use RJ-11 connectors, and 10BASE-T networks, which use RJ-45 connectors. UTP comes in the form of Cat 2, 3, 4, and 5 grades; however, only Cat 5 is now recommended for any data applications. The maximum length is 100 meters, without using any kind of signal regeneration device, and a maximum data transfer rate of 1000 Mbps for Gigabit Ethernet.

## Unshielded Twisted Pair (UTP)



- ◆ Speed and throughput: 10 - 100 Mbps
- ◆ Average \$ per node: Least Expensive
- ◆ Media and connector size: Small
- ◆ Maximum cable length: 100m (short)

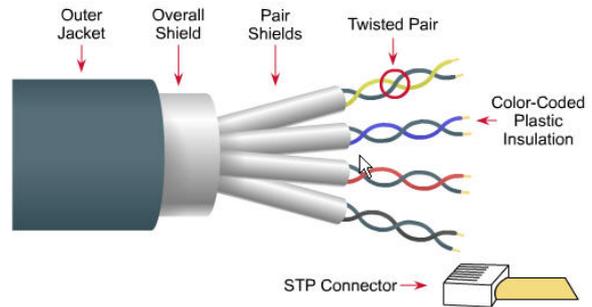
## UTP



### Shielded Twisted Pair (STP)

Shielded Twisted Pair (STP), like UTP, also has four pairs of wires with each wire in each pair twisted together. However, the difference is that STP is surrounded with a foil shield and copper braided around the wires that allows more protection from any external electromagnetic interference. Because of the shielding, the cable is physically larger, more difficult to install and terminate, and more expensive than UTP. For applications in electrically noisy environments, STP uses RJ-45, RJ-11, RS-232, and RS-449 connectors. Like UTP, STP also comes in Cat 2, 3, 4, or 5 grades; however, only Cat5 is recommended for any data applications. The maximum cable length with no signal regenerating device is 100 meters, with a maximum data transfer rate is 500 Mbps.

### STP (Shielded Twisted Pair)



- ◆ Speed and throughput: 10 - 100 Mbps
- ◆ Average \$ per node: Moderately Expensive
- ◆ Media and connector size: Medium to Large
- ◆ Maximum cable length: 100m (short)

### RJ-45

