Cabling Types / Definitions

UTP (Unshielded Twisted Pair)	Used primarily for data transmission in local area networks (LANs), UTP network cable is a 4-pair, 100-ohm cable that consists of 4 unshielded twisted pairs surrounded by an outer jacket. Each pair is wound together for the purposes of canceling out noise that can interfere with the signal. UTP cabling systems are the most commonly deployed cable type in the U.S.
F/UTP (foil unshielded twisted pair)	F/UTP cable consists of four unshielded twisted pairs surrounded by an overall foil shield. F/UTP has also been referred to as ScTP (screened twisted pair) and FTP (foiled twisted pair). F/UTP cable is not as common as UTP, but is sometimes deployed in environments where electromagnetic interference (EMI) is a significant concern. With shielded systems, the foil shield must maintain continuity throughout the entire system.
S/FTP (shielded foil twisted pair)	S/FTP consists of four foil-shielded twisted pairs surrounded by an overall braided shield. This fully shielded cable is often referred to as PiMF (pairs in metal foil), or SSTP. It is the primary cable type deployed in Europe, but rarely seen in the U.S. With shielded systems, the foil shield must maintain continuity throughout the entire system.
Category 5 Cable	Category 5e cable is an enhanced version of Category 5 that adheres to more stringent standards (see comparison chart below). It is capable of transmitting data at speeds of up to 1000 Mbps (1 Gigabit per second).
Category 6 Cable	Category 6 cable was designed to perform at frequencies of up to 250 MHz and offers higher performance for better transmission of data at speeds up to 1000 Mbps (see comparison chart below). Some properly installed Category 6 cable will also support 10 Gigabit speeds, but likely with limitations on length (look for our upcoming Category 6A / 10 Gig tutorial).
Augmented Category 6 (6A) (Work Area Outlet)	Category 6A cable is the latest twisted-pair cable type defined in February 2008 under the newest version of the TIA 568-B standard (568-B.2-10). Category 6A operates at frequencies of up to 500 MHz and can support transmission speeds at 10 Gigabits per second (Gbps). (Look for our upcoming Category 6A / 10 Gig tutorial.)
Category 7	Prior to Category 6A cable, Category 7 cable was designed to transmit data at 10-gigabit speeds. Category 7 cable is an F/STP (PiMF) cable that includes shielding for individual pairs and the cable as a whole. Category 7 is terminated with RJ-45 compatible GG45 connectors or TERA connectors, and it is rated for transmission frequencies up to 600 MHz. This cable type is rarely installed in the U.S.
RJ45 Jack	The RJ45 jack is an 8-conductor, compact, modular jack used to terminate UTP data cable. RJ45 jacks are engineered to maintain specific Category 5, 5e, 6, or 6A performance, and therefore must match the category of the cable they are terminating.
Patch Panel	A Patch Panel is a series of RJ45 jacks condensed onto a single panel. Common panel configurations include 12, 24, 48, and 96 ports. Patch panels are typically deployed where horizontal cables converge, and are used to interconnect or crossconnect links to a network switch or hub.
Patch Cable	A Patch Cable is a cable assembly that consists of a length of UTP cable with an RJ45 male connector crimped onto each end. This cable assembly is used to provide connectivity between any two RJ45 jacks. The two most common uses for patch cables are for connecting patch panel ports to other patch panel ports or to switch ports, and for connecting the work area outlet (jack) to the computer or other networked device.
Star Configuration	In a Star Topology, network links are distributed from one central switch or hub. This configuration provides and easy-to-understand layout, offers a centralized management point, and ensures that if one network link fails, all others can still function.
ANSI/EIA/TIA-568B Standard	This standard was published in 2001 to replace the 568A standard, which is now obsolete. The original purpose of the EIA/TIA 568 standard was to create a multiproduct, multivendor, standard for interoperable connectivity. The 568B standard sets minimum requirements for the various categories of cabling. The most recent version of the 568B standard (568B.2-10) published in February 2008 defines the requirements of twisted-pair cabling to support 10 Gigabit transmission. The 568 "standard" is not to be confused with 568A or 568B wiring schemes.
568A and 568B Wiring Schemes	When we refer to a jack or a patch panel's wiring connection, we refer to either the 568A or 568B wiring scheme, which define the pin-pair assignments for terminating UTP cable. The only difference between 568A and 568B is that pairs 2 and 3 (orange and green) are swapped. For more information, see the following section on wiring schemes.
Bend Radius	Bend radius is the minimum radius a cable can be bent without kinking it, damaging it, or shortening its life. The minimum bend radius for Category 5, 5e, and 6 cable is four times the cable diameter, which is approximately 1 inch. When cabling is bent beyond this specified minimum bend radius, it can cause transmission failures. All pathways must maintain the minimum bend radius wherever the cable makes a bend.
Firestopping	Firestopping is the sealing of holes made in fire walls and floors during cable installation.

	Firestopping materials and products are designed to restore the fire rating to what it was before penetrating the wall or floor.
Wiremap	This is the most basic test that can be performed on a UTP network link. Wiremap tests for continuity between two devices. Whether using 568A or 568B wiring scheme, all eight pins of each device should be wired straight through (pins 1 through 8 on one end are connected to pins 1 through 8 on the other end). A wiremap test also tests for opens, shorts, grounding, and external voltage.
Crosstalk	Crosstalk is the "bleeding" of signals from one pair in a cable onto another pair through induction (wires need not make contact because signals are transferred magnetically). Crosstalk is an unwanted effect that can cause slow data transfer, or completely inhibit the transfer of data signals. Crosstalk is minimized by the twisting of the pairs in the cable. Fiber Optic cable is the only cable medium that is 100% immune to the effects of crosstalk or EMI.
Electromagnetic Interference (EMI)	Similar to crosstalk, EMI is an unwanted signal that is induced into the cable. The difference is that EMI typically comes from a source that is external to the cable, such as an electrical cable or device.
Near-end Crosstalk (NEXT)	NEXT is a testing parameter that measures the crosstalk from an interfering pair transmitting at the same end of a network link.
Far-end Crosstalk (FEXT)	FEXT is a testing parameter that measures the crosstalk from an interfering pair transmitting from the other end of the link. FEXT is measured as Equal Level FEXT (ELFEXT), which compensates for attenuation by subtracting it from the interfering pair.
Power Sum NEXT (PSNEXT)	PSNEXT is the sum of the NEXT induced on a pair from all other adjacent pairs. PSNEXT is a more stringent measurement than NEXT because it measures the total possible crosstalk from multiple pairs in the same cable, not just the crosstalk from one pair to another pair. PSNEXT is only critical in high-speed networks that transmit data over multiple pairs.
Power Sum ELFEXT (PSELFEXT)	Like PSNEXT, PSELFEXT is the sum of the ELFEXT induced on a pair from all other adjacent pairs. PSELFEXT is only critical in high-speed networks that transmit data over multiple pairs.
Attenuation	Attenuation is the loss of signal over the length of a network link due to the resistance of the wire plus other electrical factors that cause additional resistance (impedance and capacitance for example). A longer cable length, poor connections, bad insulation, a high level of crosstalk, or EMI can all increase attenuation. For each category of cable, the TIA-568B standard specifies the maximum amount of attenuation that is acceptable in a network link.
Attenuation to Crosstalk Ratio (ACR)	ACR is probably the most important result when testing a link. ACR is the difference between the signal attenuation and the near-end crosstalk, representing the strength of the attenuated signal in the presence of crosstalk. If ACR is not high enough, errors will occur or the data signal can be lost. Power Sum ACR (PSACR) is calculated in the same way as ACR, but uses the PSNEXT results rather than NEXT.
Return Loss	Return Loss is the difference between the power of a transmitted signal and the power of the signal reflections caused by variations in link and channel impedance.
Propagation Delay	Propagation Delay tests for the time it takes for the signal to be sent from one end of a link and received by the other end.
Delay Skew	Only a critical parameter in high-speed networks that transmit data using multiple pairs, Delay Skew is the difference in time between the fastest arrival of a data signal on a pair and the slowest. Signals divided over multiple pairs need to reach the other end within a certain amount of time to be re-combined correctly.