

Table 4.3 Twisted Pair Categories and Classes

	Category 3 Class C	Category 5 Class D	Category 5E	Category 6 Class E	Category 7 Class F
Bandwidth	16 MHz	100 MHz	100 MHz	200 MHz	600 MHz
Cable Type	UTP	UTP/FTP	UTP/FTP	UTP/FTP	SSTP
Link Cost (Cat 5 =1)	0.7	1	1.2	1.5	2.2

UTP = Unshielded twisted pair

FTP = Foil twisted pair

SSTP = Shielded screen twisted pair

Table 4.4 High Performance LAN Copper Cabling Alternatives [JOHN98]

Name	Construction	Expected Performance	Cost
Category 5 UTP	Cable consists of 4 pairs of 24 AWG (0.50 mm) copper with thermoplastic polyolefin or fluorinated ethylene propylene (FEP) jacket. Outside sheath consists of polyvinylchlorides (PVC), a fire retardant polyolefin or fluoropolymers.	Mixed and matched cables and connecting hardware from various manufacturers that have a reasonable chance of meeting TIA Cat 5 Channel and ISO Class D requirements. No manufacturer's warranty is involved.	1
Enhanced Cat 5 UTP (Cat 5E)	Cable consists of 4 pairs of 24 AWG (0.50 mm) copper with thermoplastic polyolefin or fluorinated ethylene propylene (FEP) jacket. Outside sheath consists of polyvinylchlorides (PVC), a fire retardant polyolefin or fluoropolymers. Higher care taken in design and manufacturing.	Category 5 components from one supplier or from multiple suppliers where components have been deliberately matched for improved impedance and balance. Offers ACR performance in excess of Cat 5 Channel and Class D as well as a 10-year or greater warranty.	1.2
Category 6 UTP	Cable consists of 4 pairs of 0.50 to 0.53 mm copper with thermoplastic polyolefin or fluorinated ethylene propylene (FEP) jacket. Outside sheath consists of polyvinylchlorides (PVC), a fire retardant polyolefin or fluoropolymers. Extremely high care taken in design and manufacturing. Advanced connector designs.	Category 6 components from one supplier that are extremely well matched. Channel zero ACR point (effective bandwidth) is guaranteed to 200 MHz or beyond. Best available UTP. Performance specifications for Category 6 UTP to 250 MHz are under development.	1.5
Foil Twisted Pair	Cable consists of 4 pairs of 24 AWG (0.50 mm) copper with thermoplastic polyolefin or fluorinated ethylene propylene (FEP) jacket. Pairs are surrounded by a common metallic foil shield. Outside sheath consists of polyvinylchlorides (PVC), a fire-retardant polyolefin or fluoropolymers.	Category 5 components from one supplier or from multiple suppliers where components have been deliberately designed to minimize EMI susceptibility and maximize EMI immunity. Various grades may offer increased ACR performance.	1.3
Shielded Foil Twisted Pair	Cable consists of 4 pairs of 24 AWG (0.50 mm) copper with thermoplastic polyolefin or fluorinated ethylene propylene (FEP) jacket. Pairs are surrounded by a common metallic foil shield, followed by a braided metallic shield. Outside sheath consists of polyvinylchlorides (PVC), a fire retardant polyolefin, or fluoropolymers.	Category 5 components from one supplier or from multiple suppliers where components have been deliberately designed to minimize EMI susceptibility and maximize EMI immunity. Offers superior EMI protection to FTP.	1.4
Category 7 Shielded-Screen Twisted Pair	Also called PiMF (for Pairs in Metal Foil), SSTP of 4 pairs of 22-23AWG copper with a thermoplastic polyolefin or fluorinated ethylenepropylene (FEP) jacket. Pairs are individually surrounded by a helical or longitudinal metallic foil shield, followed by a braided metallic shield. Outside sheath of polyvinylchlorides (PVC), a fire-retardant polyolefin, or fluoropolymers.	Category 7 cabling provides positive ACR to 600 to 1200 MHz. Shielding on the individual pairs gives it phenomenal ACR.	2.2

ACR = Attenuation to crosstalk ratio

EMI = Electromagnetic interference

Table 4.5 Frequency Utilization for Fiber Applications

Wavelength (in vacuum) range (nm)	Frequency range (THz)	Band label	Fiber type	Application
820 to 900	366 to 333		Multimode	LAN
1280 to 1350	234 to 222	S	Single mode	Various
1528 to 1561	196 to 192	C	Single mode	WDM
1561 to 1620	192 to 185	L	Single mode	WDM

WDM = wavelength division multiplexing (see Chapter 8)

Table 4.6 Typical Digital Microwave Performance

Band (GHz)	Bandwidth (MHz)	Data Rate (Mbps)
2	7	12
6	30	90
11	40	135
18	220	274