

LOCAL AREA NETWORKING OVERVIEW

TIA/EIA 568-B.1

TIA/EIA 568-B.2

TIA/EIA 568-B.2-1

NETWORKING CABLES

LOCAL AREA NETWORK OVERVIEW

INFORMATION CONTAINED IN THIS WEST PENN WIRE/CDT TECHNICAL BULLETIN HAS BEEN PROVIDED BY THE FOLLOWING STANDARDS AND MANUALS.

- TIA/EIA 568-B-1- Commercial Building Telecommunications Standard: Part 1: *General Requirements*
- TIA/EIA 568-B-2- Commercial Building Telecommunications Standard: Part 2 *Balanced Twisted Pair Cabling Components*
- TIA/EIA 568-B-2.1- Commercial Building Telecommunications Standard: Part 2.1 *Transmission Performance 4 pair 100Ω Category 6 Cabling*
- TIA/EIA 568-B-3 - Commercial Building Telecommunications Standard: Part 3 *Optical Fiber Cabling Components*
- TIA/EIA 568-B-3.1- Commercial Building Telecommunications Standard: Part 3.1 *50/125um Optical Fiber Specifications*
- BICSI Design Reference Manual *5th Edition*
- BICSI Telecommunication Cabling Installation Manual *3rd Edition*

BICSI:

BICSI is a non-profit telecommunications association, founded in 1974 to serve and support telephone company building industry consultants responsible for the design and distribution of telecommunications wiring in commercial and multi-dwelling buildings.

www.bicsi.org

GLOBAL ENGINEERING DOCUMENTS

To acquire telecommunication standards:

1-800-854-7179

www.global.his.com

SIGNIFICANT TECHNICAL CHANGES MADE TO THE TIA/EIA 568 STANDARDS

- Incorporation of the TSB's, Addenda, and Interim Standards from the TIA/EIA 568-A.
- The TIA/EIA 568-A Standard has been reorganized into three technical Standards;
- Category 5 is no longer recognized, and has been replaced by Category 5E and Category 6.
- Performance specifications are provided for Category 5E and Category 6.
- Performance specifications are provided for 50/125um Optical Fibers
- Small Form Factor (SFF) optical fiber connector designs are allowed in addition to the 568SC.
- The term 'Telecommunication closet' has been replaced with 'Telecommunications room'.
- The 'permanent link' has replaced the 'basic link' as the test configuration.

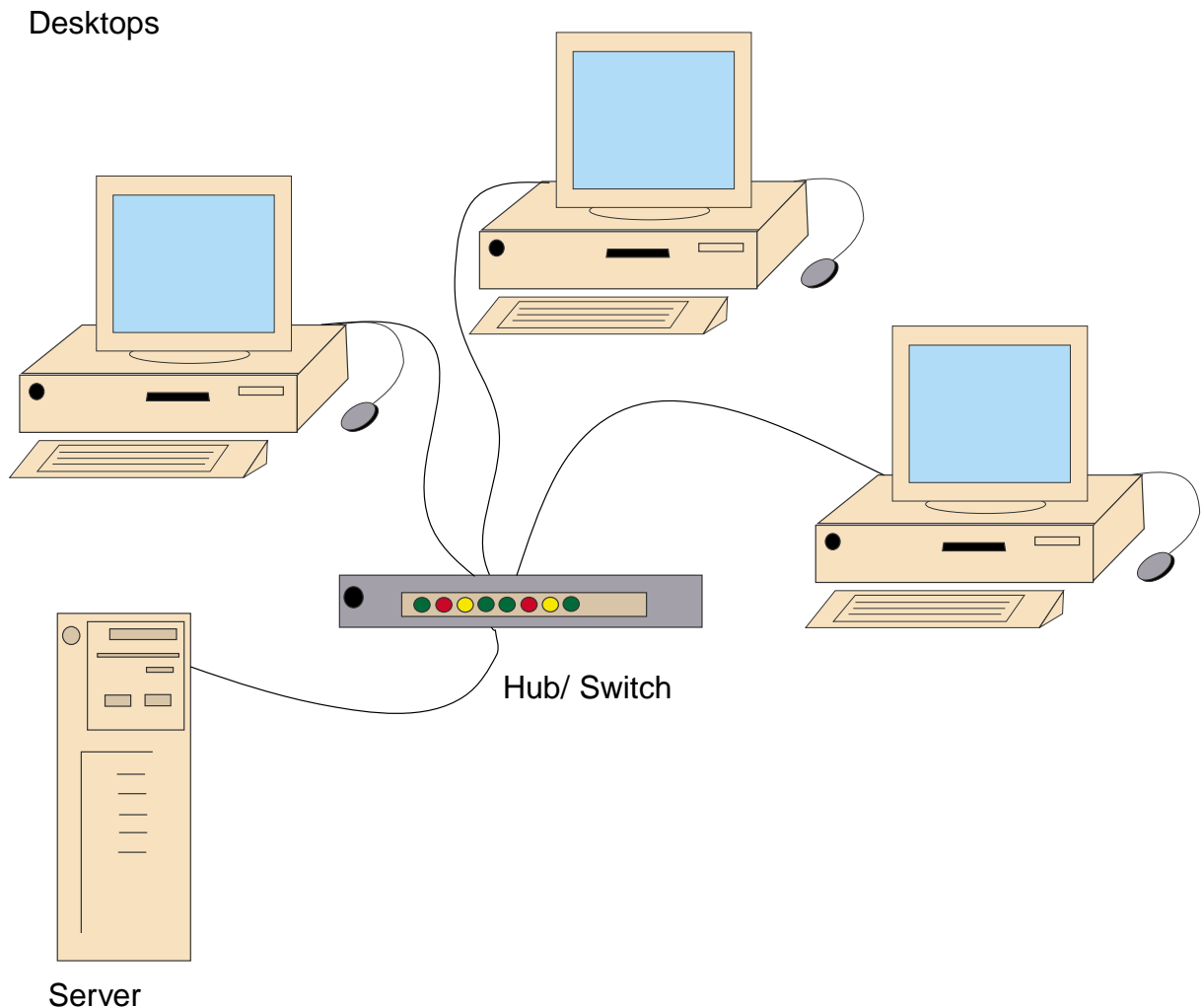
LOCAL AREA NETWORK OVERVIEW

LOCAL AREA NETWORK (LAN) CABLING:

LAN's are used to interconnect two or more personal computers (PC's) and other network devices in a geographically limited area not exceeding a multibuilding campus

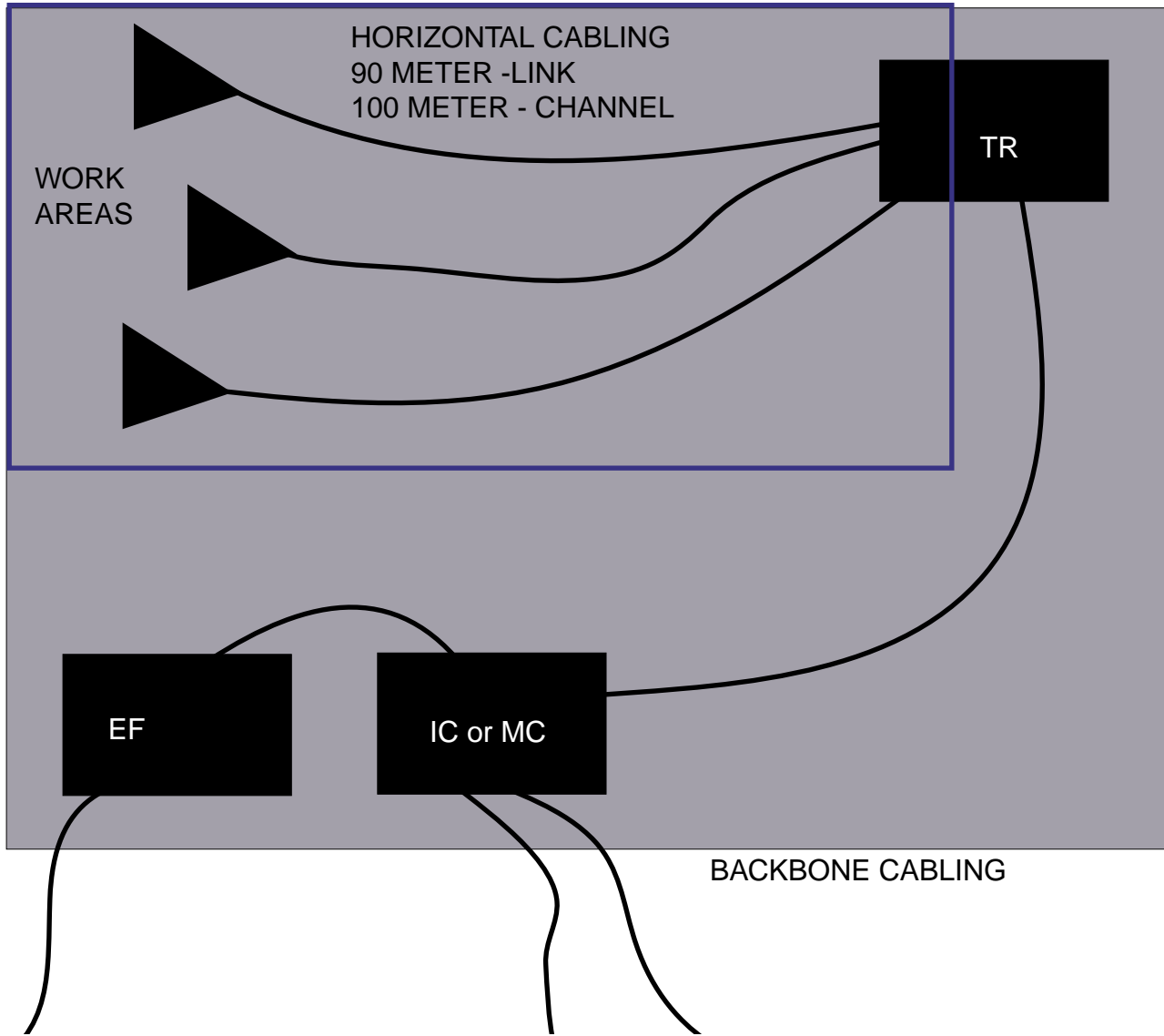
FUNDAMENTALS:

In its basic form, a LAN is a group of PC's connected with cabling links to a centralized network access device (Called a Hub, or Switch). A special purpose PC (Called a Server) is also connected to the same hub or switch and is used to coordinate network activities and store shared data.



HORIZONTAL CABLING

Horizontal cabling is used to describe cabling that links network devices in user work areas (WA's) to network equipment located in the Telecommunications Room (TR). This cabling generally extends horizontally along floors, walls, and ceilings.



REFERENCE ABBREVIATIONS:

EF- ENTRANCE FACILITY

IC- INTERMEDIATE CROSS-CONNECT

MC- MAIN CROSS-CONNECT

TR- TELECOMMUNICATIONS ROOM

WA- WORK AREA

▶ WORK AREA OUTLET/CONNECTOR

HORIZONTAL CABLING

Horizontal distribution of Cabling



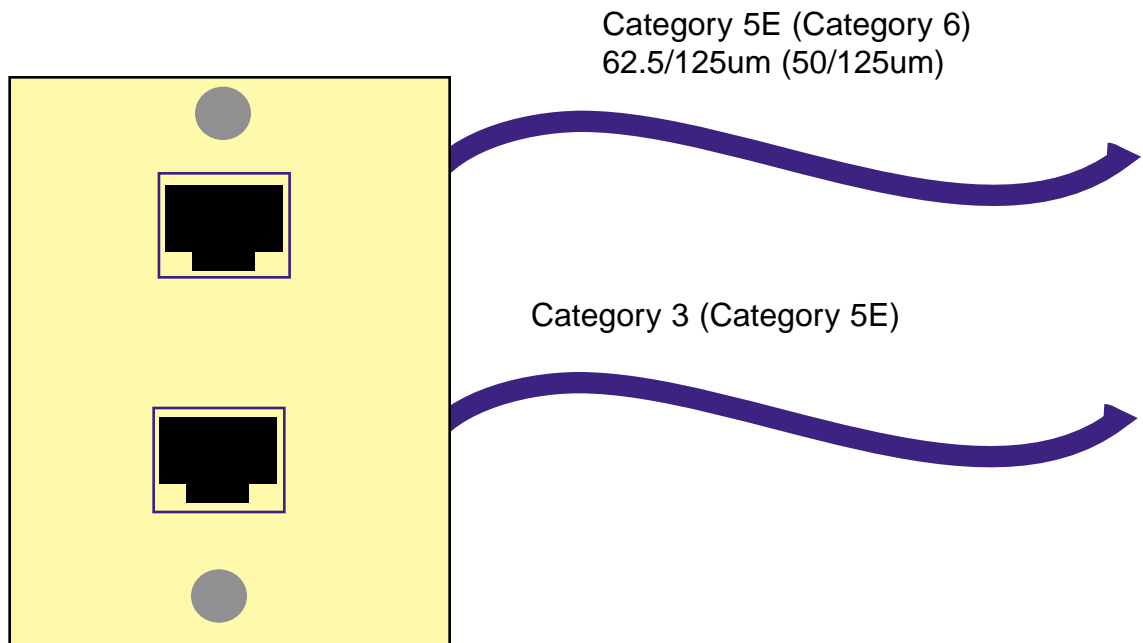
CABLING MEDIA TYPES:

- 4 pair 100Ω UTP or ScTP
 - Category 3 for Voice and Low speed Data (Category 5E Recommended)
 - Category 5E for Data
 - Category 6 Data
- Two or more Optical fibers
 - 62.5/125um
 - 50/125um
- 150Ω STP cables are recognized but not recommended .

WORK AREA:

2 Outlet/Connectors Minimum:

- One for Voice and Low Speed Data -4 pair Category 3 Minimum (Category 5E Recommended)
- One for Data - 4 pair Category 5E or Category 6
2- fiber 62.5/125um or 50/125um



HORIZONTAL CABLING DISTANCES

Horizontal Link: From the Telecommunications room to the Work area outlet/Connector

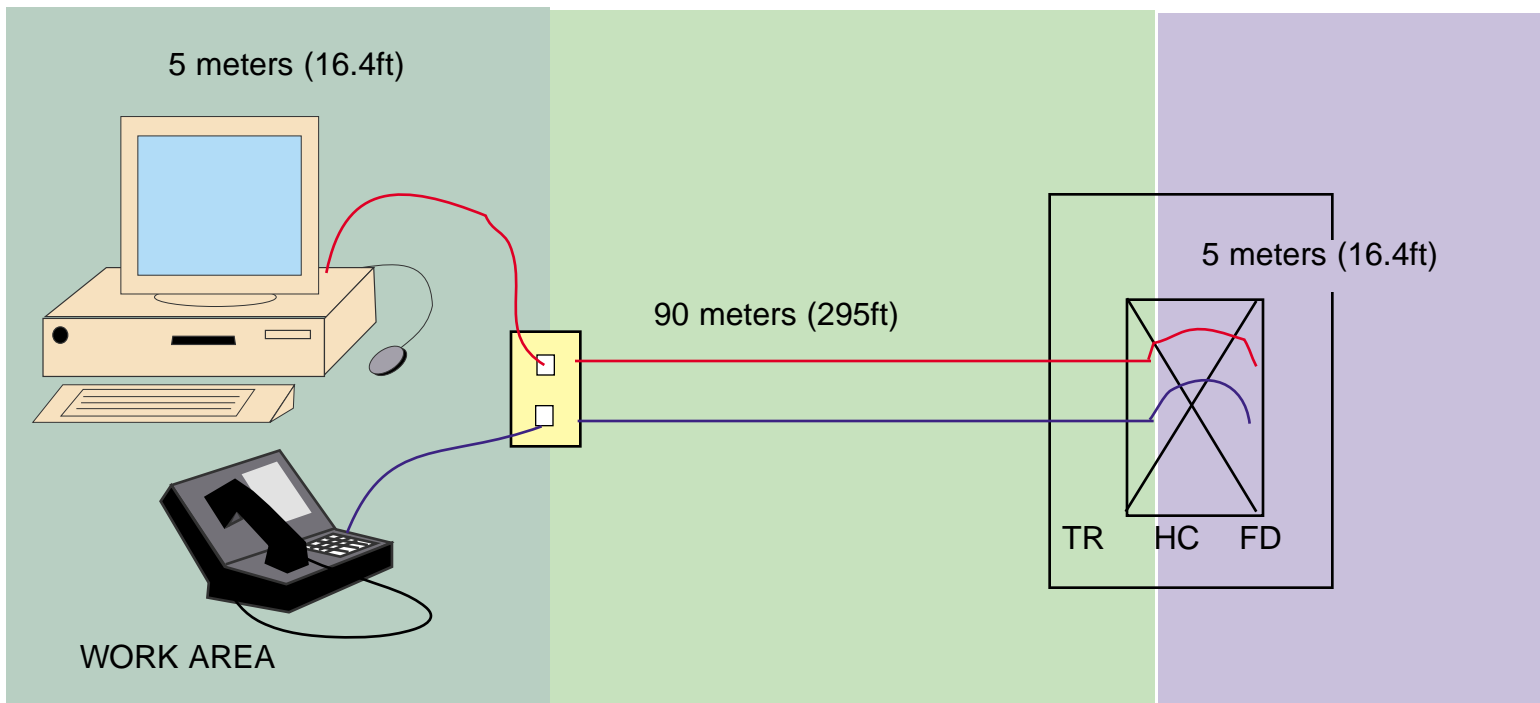
- 90 meters (295ft)

Horizontal Cabling Patchcables and jumpers located in the TR and WA.

- Total of 10 meters (32.8ft)

Horizontal Channel: Includes all cabling runs.

- 100 meters (328ft)



NOTE:

TR-TELECOMMUNICATION ROOM
HC-HORIZONTAL CROSS-CONNECT
FD- FLOOR DISTRIBUTION

THERE IS SOME STIPULATION WITHIN THE TIA/EIA 568-B.1 STANDARDS FOR DISTANCE FOR UTP, S_cTP, AND OPTICAL FIBERS

HORIZONTAL TOPOLOGY:

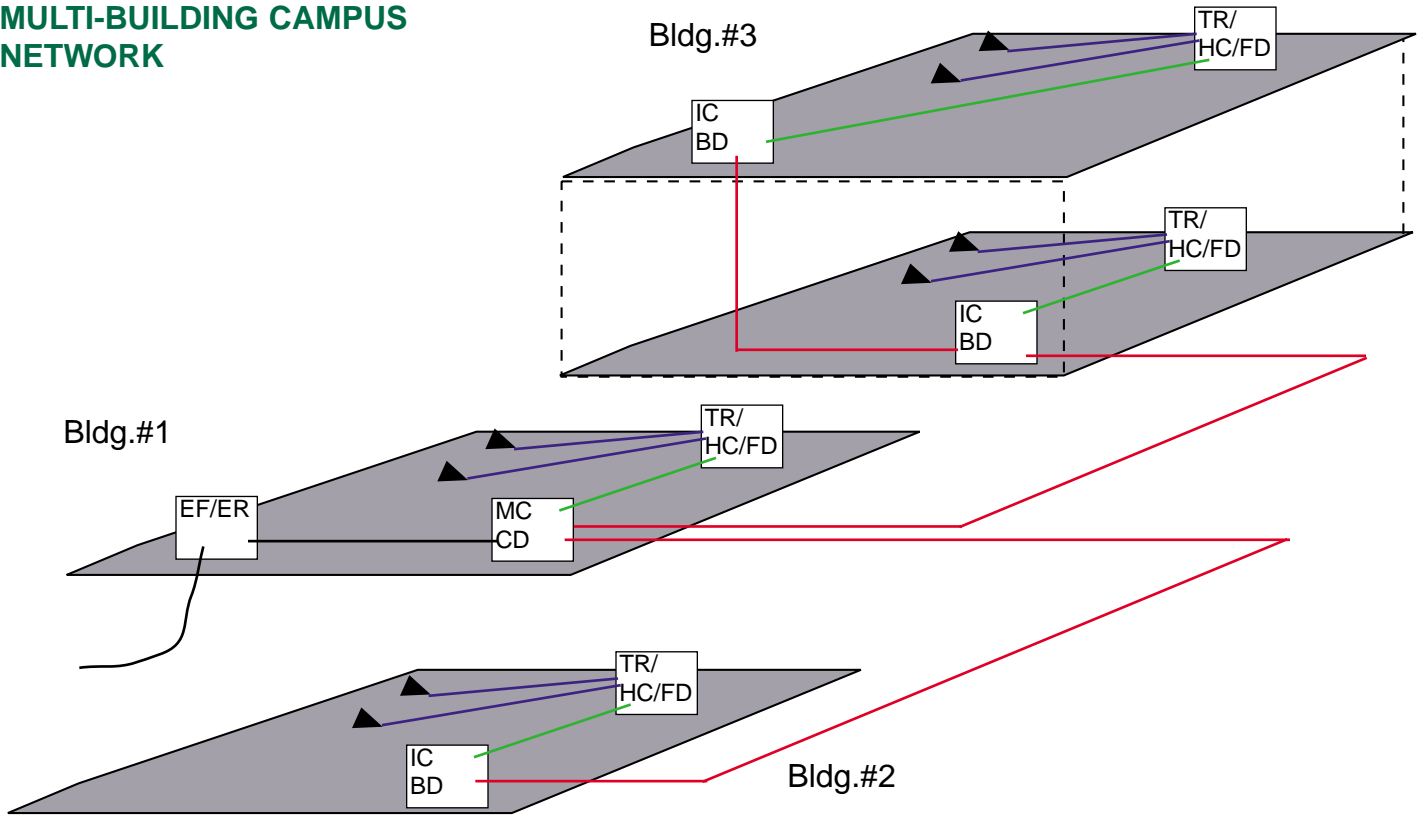
STAR CONFIGURATION
HOMERUN CABLING

BACKBONE CABLING

Cabling that provides connection between EF, ER, and TR within or between buildings

- Intrabackbone- backbone cabling internal building
- Interbackbone- backbone cabling between buildings

MULTI-BUILDING CAMPUS NETWORK



REFERENCE ABBREVIATIONS:

ER- EQUIPMENT ROOM
EF- ENTRANCE FACILITY
TR- TELECOMMUNICATIONS ROOM
TE- TELECOMMUNICATIONS ENCLOSURE

USED TO DESCRIBE TELECOMMUNICATION SPACES

MC- MAIN CROSS-CONNECT
IC- INTERMEDIATE CROSS-CONNECT
HC- HORIZONTAL CROSS-CONNECT

USED TO DESCRIBE THE FUNCTIONAL CROSS-CONNECTION OF THE TELECOMMUNICATION CABLING

CD- CAMPUS DISTRIBUTION
BD- BUILDING DISTRIBUTION
FD- FLOOR DISTRIBUTION

INTERNATIONAL STANDARDS TO THE MC, IC, HC

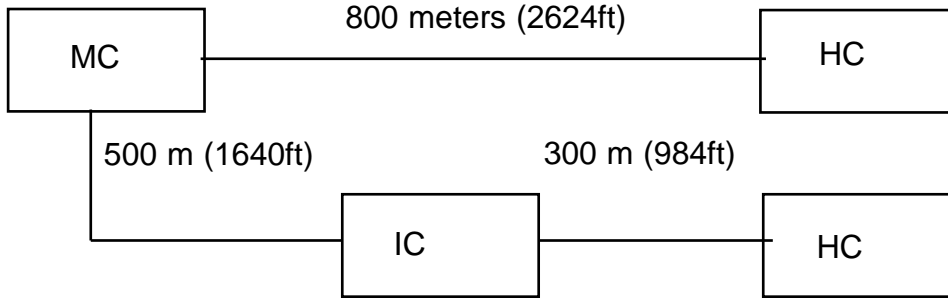
BACKBONE CABLING

CABLING MEDIA RECOGNIZED:

- 100Ω Balanced Twisted Pair (4-25 pairs)
- 62.5/125um or 50/125um MultiMode
- 8-9/125um Single-Mode

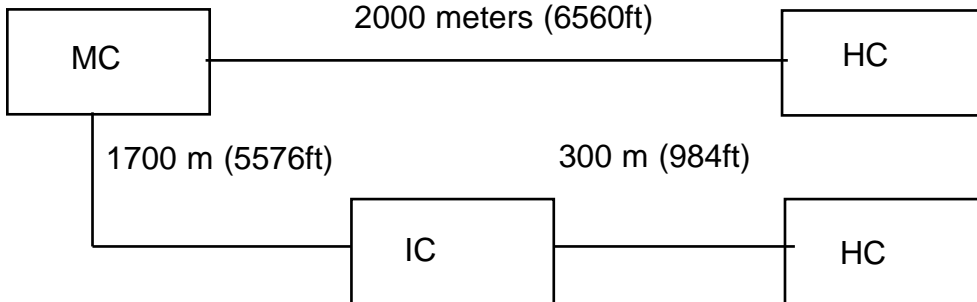
BACKBONE CABLING DISTANCES:

UTP and ScTP Distances:

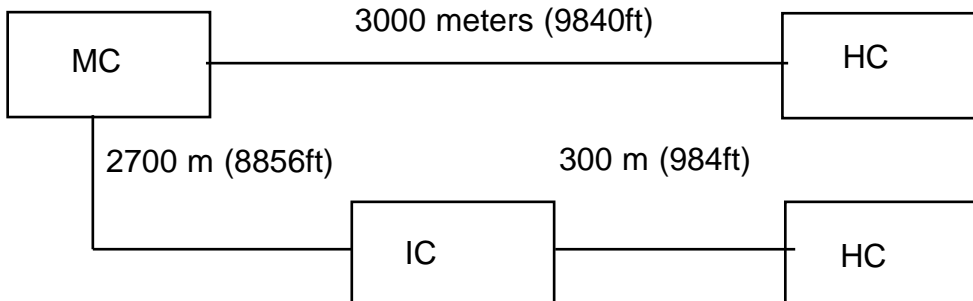


- UTP and ScTP distances are based on Voice and Low Speed Data Applications

Multimode Optical Fiber Distances:



Single-Mode Optical Fiber Distances



TOPOLOGY:

STAR CONFIGURATION

CABLES

BALANCED TWISTED PAIRS;

To Form a balanced twisted pair, two individual insulated copper wires are physically twisted together. Twisting reduces interferences from outside sources.

Twisting the two wires together exposes each wire equally to potential interference from internal and external sources and caused this interference to be mitigated. Immunity to interference is an important feature for LAN's. Interference above a given threshold will cause errors in the network.

Each twisted pair in a 4 pair cable vary. The twisting or lay difference helps in reducing interference between each of the pairs

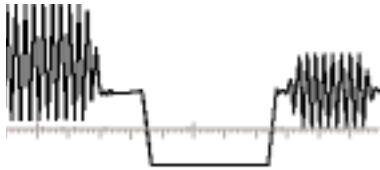
STANDARDS:

TIA/EIA 568-B.2 - CATEGORY 5E SPECIFICATIONS

TIA/EIA 568-B.2-1 CATEGORY 6 SPECIFICATIONS

TESTING SPECIFICATIONS:

Test	Cat 5E Spec	Cat 6 Spec	
	100 Mhz	100 Mhz	250 Mhz
Insertion Loss	22.0	19.8	32.8
NEXT	35.3	44.3	38.3
PS-NEXT	32.3	42.3	36.3
EL-FEXT	23.8	27.8	19.8
PS EL-FEXT	20.8	24.8	16.8
Return Loss	20.1	20.1	17.3

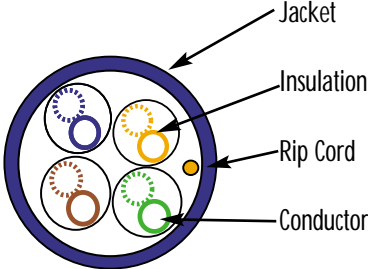


Digital Integration Category 5E Cable

Rev.2. 5/02

Description:

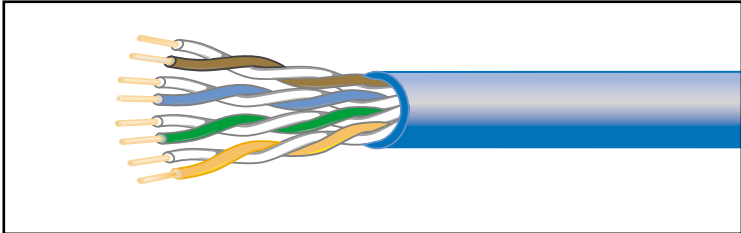
- Multiple pair Category 5E cable
- Enhanced UTP Category Cable
- 4 pair 24AWG unshielded
- Thermoplastic insulation
- Each pair twisted in varied lays
- Thermoplastic jacket



Applications:

High performance horizontal wiring that meets or exceeds industry standards for:

- Analog and Digital voice systems
- Intercom systems
- Security (CCTV) systems
- 10 Base-T, 100 Base-T, and 1000 Base-T
- FDDI TP-PMD
- 16Mbps Token Ring
- Home Networking
- ATM 155Mbps
- 550 Mhz Broadband video and standards under development such as: 622Mbps ATM



Rating:

- UL listed NEC type CMR or MPR as defined in NEC Article 800
- Constructed in accordance with UL Standard 444
- Complies with UL 1666 Vertical Tray Flame Test
- Meets and Exceeds TIA/EIA 568-B.2 Specifications
- Verified to Category 5E requirements by independent third party testing laboratory

Color Code:

Pair No.	1st Conductor	2nd Conductor
1	White/Blue	Blue
2	White/Orange	Orange
3	White/Green	Green
4	White/Brown	Brown

Installation Characteristics:

- Cable Weight: 22lbs/1000ft (33kg/km)
- Bending Radius: 1" (25.4mm)Min (4x Cable O.D.)
- Pulling Tension: 25lbf (110N)
- Operating Temp: -34°C to +60°C (-30°F to +140°F)
- Storage Temp: -34°C to +75°C (-30°F to +167°F)
- Installation Temp: -20°C to +60°C (-4°F to +140°F)

Mechanical Characteristics	
Number of Pairs	4
Awg. Size	24
Conductor Type	Solid Bare Copper
Insulation	Thermoplastic
Nom. Jacket Thickness	.020 in (.51mm)
Nom. O.D.	.194 in. (4.93mm)
Jacket Type Color	Gray, Blue, White, Pink

WEST PENN WIRE



Frequency Mhz	Attenuation			NEXT		ACR*	PS-NEXT		PS-ACR	ELFEXT	PS-ELFEXT	SRL (db)	RL (db)
	db/100m	min.	db/100ft	avg.	min.	min.	avg.	min.	min.	min.	min.		
.772	1.6	1.8	5.5	79	68.0	66.2	72	69.0	67.2	--	--	--	--
1.0	1.8	2.0	6.3	74	66.3	64.3	70	67.3	65.3	63.8	60.8	23.0	22.0
4.0	3.8	4.1	13	65	57.3	53.2	60	58.3	54.2	51.7	48.7	23.0	23.0
8.0	5.4	5.8	18	61	52.8	47.0	57	53.8	48.1	45.7	42.7	23.0	24.5
10.0	6.0	6.5	20	59	51.3	44.8	55	52.3	46.0	43.8	40.8	23.0	25.0
16.0	7.6	8.2	25	56	48.3	40.1	52	49.3	41.2	39.7	36.7	23.0	25.0
20.0	8.6	9.3	28	55	49.8	37.5	50	47.8	38.7	37.7	34.7	23.0	25.0
25.0	9.7	10.4	32	53	48.3	34.9	49	46.3	36.1	35.8	32.8	22.0	24.3
31.25	11.0	11.5	36	51	46.9	32.2	48	44.9	33.4	33.9	30.9	21.1	23.6
62.5	16.1	16.7	52	47	42.4	22.4	42	39.4	22.7	27.8	24.8	18.1	21.5
100.0	21.0	21.6	67	44	39.3	14.3	40	37.3	15.7	23.8	20.8	16.0	20.1
155.0	26.9	27.6	85	42	36.5	5.4	37	34.1	6.5	19.9	16.9	14.1	18.8
200.0	31.1	31.9	97	40	34.8	2.9	36	32.8	0.9	17.7	14.7	13.0	18.0
350.0	43.0	44.2	135	36	31.2	--	32	29.2	--	12.9	9.9	10.6	16.3

TIA/EIA 568-B.2 CABLE MINIMUM SPECIFICATION: 100Mhz

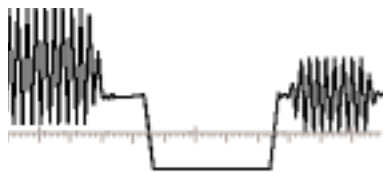
Up to 200Mhz minimum requirements
201-350Mhz information purposes

- Attenuation: 22dB
- NEXT: 35.3dB
- PS-NEXT: 32.3dB
- ELFEXT: 23.8dB
- PS-ELFEXT: 20.8dB
- Return Loss 20.1dB

WEST PENN WIRE

2833 West Chestnut Street
Washington, Pennsylvania 15301

Phone: 1-800-245-4964
Fax: 724-222-6420

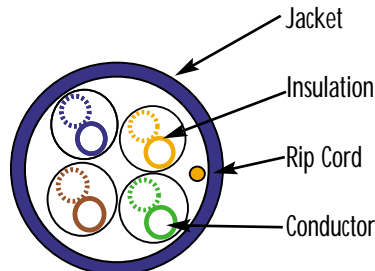


**Digital Integration Category 5E Cable
Plenum**

Rev.2. 5/02

Description:

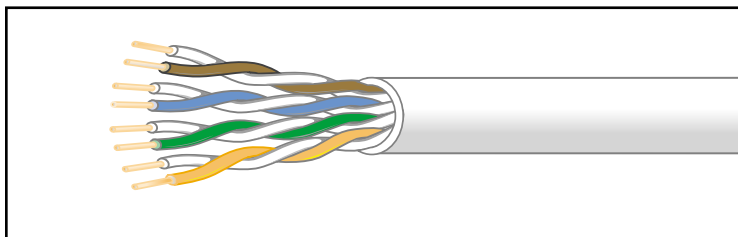
- Multiple pair Category 5E cable
- Enhanced UTP Category Cable
- 4 pair 24AWG unshielded
- FEP- Teflon insulation
- Each pair twisted in varied lays
- Thermoplastic Plenum jacket



Applications:

High performance horizontal wiring that meets or exceeds industry standards for:

- Analog and Digital voice systems
- Intercom systems
- Security (CCTV) systems
- 10 Base-T, 100 Base-T, and 1000 Base-T
- FDDI TP-PMD
- 16Mbps Token Ring
- Home Networking
- ATM 155Mbps
- 550 Mhz Broadband video and standards under development such as: 622Mbps ATM



Rating:

- UL listed NEC type CMP or MPP as defined in NEC Article 800
- Constructed in accordance with UL Standard 444
- Complies with UL 910 Test modified ASTM Steiner Tunnel Test
- Meets and Exceeds TIA/EIA 568-B.2 Specifications
- Verified to Category 5E requirements by independent third party testing laboratory

Color Code:

Pair No.	1st Conductor	2nd Conductor
1	White/Blue	Blue
2	White/Orange	Orange
3	White/Green	Green
4	White/Brown	Brown

Installation Characteristics:

Cable Weight:	23lbs/1000ft (33kg/km)
Bending Radius:	1" (25.4mm)Min (4x Cable O.D.)
Pulling Tension:	25lbf (110N)
Operating Temp:	-34°C to +60°C (-30°F to +140°F)
Storage Temp:	-34°C to +75°C (-30°F to +167°F)
Installation Temp:	-20°C to +60°C (-4°F to +140°F)

Mechanical Characteristics	
Number of Pairs	4
Awg. Size	24
Conductor Type	Solid Bare Copper
Insulation	FEP- Teflon**
Nom. Jacket Thickness	.020 in (.51mm)
Nom. O.D.	.180 in. (4.75mm)
Jacket Type Color	Gray, Blue, White, Pink

**Teflon is a registered trademark of Dupont

WEST PENN WIRE



Frequency Mhz	Attenuation			NEXT		ACR*	PS-NEXT		PS-ACR	ELFEXT	PS-ELFEXT	SRL (db)	RL (db)
	db/100m	db/100ft	min.	avg.	min.	min.	avg.	min.	min.	min.	min.		
.772	1.6	1.8	5.5	79	68.0	66.2	72	69.0	67.2	--	--	--	--
1.0	1.8	2.0	6.3	74	66.3	64.3	70	67.3	65.3	63.8	60.8	23.0	22.0
4.0	3.8	4.1	13	65	57.3	53.2	60	58.3	54.2	51.7	48.7	23.0	23.0
8.0	5.4	5.8	18	61	52.8	47.0	57	53.8	48.1	45.7	42.7	23.0	24.5
10.0	6.0	6.5	20	59	51.3	44.8	55	52.3	46.0	43.8	40.8	23.0	25.0
16.0	7.6	8.2	25	56	48.3	40.1	52	49.3	41.2	39.7	36.7	23.0	25.0
20.0	8.6	9.3	28	55	49.8	37.5	50	47.8	38.7	37.7	34.7	23.0	25.0
25.0	9.7	10.4	32	53	48.3	34.9	49	46.3	36.1	35.8	32.8	22.0	24.3
31.25	11.0	11.5	36	51	46.9	32.2	48	44.9	33.4	33.9	30.9	21.1	23.6
62.5	16.1	16.7	52	47	42.4	22.4	42	39.4	22.7	27.8	24.8	18.1	21.5
100.0	21.0	21.6	67	44	39.3	14.3	40	37.3	15.7	23.8	20.8	16.0	20.1
155.0	26.9	27.6	85	42	36.5	5.4	37	34.1	6.5	19.9	16.9	14.1	18.8
200.0	31.1	31.9	97	40	34.8	2.9	36	32.8	0.9	17.7	14.7	13.0	18.0
350.0	43.0	44.2	135	36	31.2	--	32	29.2	--	12.9	9.9	10.6	16.3

TIA/EIA 568-B.2 CABLE MINIMUM SPECIFICATION: 100Mhz

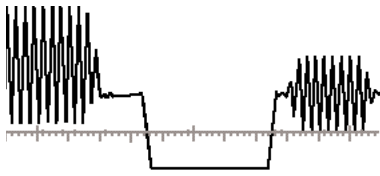
Up to 200Mhz minimum requirements
201-350Mhz information purposes

- Attenuation: 22dB
- NEXT: 35.3dB
- PS-NEXT: 32.3dB
- ELFEXT: 23.8dB
- PS-ELFEXT: 20.8dB
- Return Loss 20.1dB

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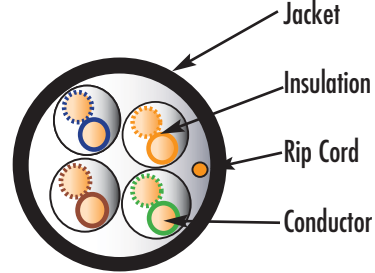


**Indoor/Outdoor Digital Integration
Category 5E Cable**

Rev.1. 2/07

Description:

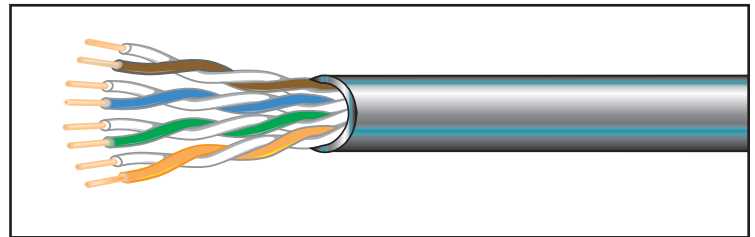
- Multiple pair Category 5E cable
- Enhanced UTP Category Cable
- 4 pair 24AWG unshielded
- Thermoplastic insulation
- Each pair twisted in varied lays
- Flooded Water-blocking Material
- Black FR Polyolefin jacket



Applications:

High performance horizontal wiring that meets or exceeds industry standards for: Indoor/Outdoor

- Analog and Digital voice systems
- Intercom systems
- Security (CCTV) systems
- 10 Base-T, 100 Base-T, and 1000 Base-T
- FDDI TP-PMD
- 16Mbps Token Ring
- Home Networking
- ATM 155Mbps
- 550 Mhz Broadband video and standards under development such as: 622Mbps ATM



Color Code:

Pair No.	1st Conductor	2nd Conductor
1	White/Blue	Blue
2	White/Orange	Orange
3	White/Green	Green
4	White/Brown	Brown

Rating:

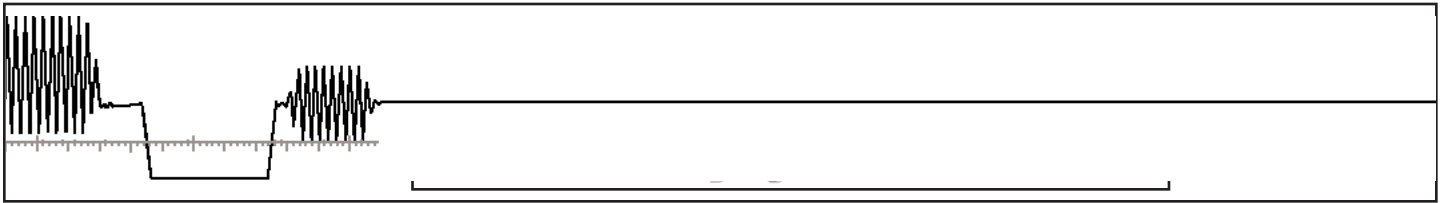
- UL listed NEC type CM as defined in NEC Article 800
- Complies with UL 1581 Test
- Meets and Exceeds TIA/EIA 568-B.2 Specifications
- Verified to Category 5E requirements by independent third party testing laboratory

Installation Characteristics:

Cable Weight:	38lbs/1000ft (57kg/km)
Bending Radius:	2.5" (61mm)Min (10 x Cable O.D.)
Pulling Tension:	25lbf (110N)
Operating Temp:	-20°C to +60°C (-4°F to +140°F)
Storage Temp:	-40°C to +75°C (-40°F to +167°F)
Installation Temp:	-20°C to +60°C (-4°F to +140°F)

Mechanical Characteristics	
Number of Pairs	4
Awg. Size	24
Conductor Type	Solid Bare Copper
Insulation	Thermoplastic
Nom. Jacket Thickness	.040 in (1.02mm)
Nom. O.D.	.251 in. (6.38mm)
Jacket Type Color	Black



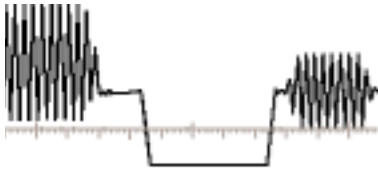


Frequency Mhz	Attenuation			NEXT		ACR*	PS-NEXT		PS-ACR	ELFEXT	PS-ELFEXT	SRL (db)	RL (db)
	db/100m	db/100ft	min.	avg.	min.	min.	avg.	min.	min.	min.	min.	min.	min.
.772	1.6	1.8	5.5	79	68.0	66.2	72	69.0	67.2	--	--	--	--
1.0	1.8	2.0	6.3	74	66.3	64.3	70	67.3	65.3	63.8	60.8	23.0	22.0
4.0	3.8	4.1	13	65	57.3	53.2	60	58.3	54.2	51.7	48.7	23.0	23.0
8.0	5.4	5.8	18	61	52.8	47.0	57	53.8	48.1	45.7	42.7	23.0	24.5
10.0	6.0	6.5	20	59	51.3	44.8	55	52.3	46.0	43.8	40.8	23.0	25.0
16.0	7.6	8.2	25	56	48.3	40.1	52	49.3	41.2	39.7	36.7	23.0	25.0
20.0	8.6	9.3	28	55	49.8	37.5	50	47.8	38.7	37.7	34.7	23.0	25.0
25.0	9.7	10.4	32	53	48.3	34.9	49	46.3	36.1	35.8	32.8	22.0	24.3
31.25	11.0	11.5	36	51	46.9	32.2	48	44.9	33.4	33.9	30.9	21.1	23.6
62.5	16.1	16.7	52	47	42.4	22.4	42	39.4	22.7	27.8	24.8	18.1	21.5
100.0	19.6	21.0	64	50	44.3	21.3	43	38.3	17.3	27.8	24.8	16.0	20.1
155.0	26.9	27.6	85	42	36.5	5.4	37	34.1	6.5	19.9	16.9	14.1	18.8
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350.0	43.0	44.2	135	36	31.2	--	32	29.2	--	12.9	9.9	10.6	16.3

TIA/EIA 568-B.2 CABLE MINIMUM SPECIFICATION: 100Mhz

- Attenuation: 22dB
- NEXT: 35.3dB
- PS-NEXT: 32.3dB
- ELFEXT: 23.8dB
- PS-ELFEXT: 20.8dB
- Return Loss 20.1dB



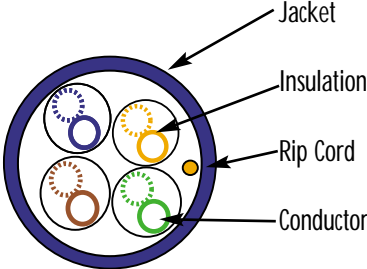


Digital Integration Category 6 Cable

Rev.1. 10/03

Description:

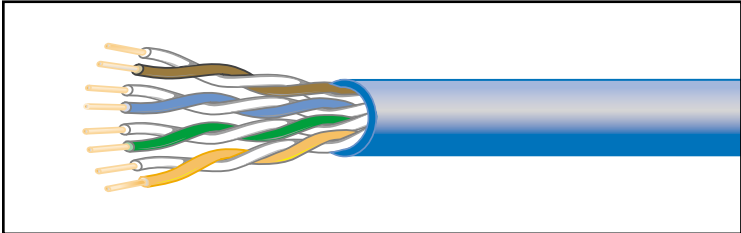
- Multiple pair Category 6 cable
- Enhanced UTP Category Cable
- 4 pair 24AWG unshielded
- Thermoplastic insulation
- Each pair twisted in varied lays
- Thermoplastic jacket



Applications:

High performance horizontal wiring that meets or exceeds industry standards for:

- Analog and Digital voice systems
- Intercom systems
- Security (CCTV) systems
- 10 Base-T, 100 Base-T, and 1000 Base-T
- FDDI TP-PMD
- 16Mbps Token Ring
- Home Networking
- ATM 155Mbps
- 550 Mhz Broadband video and standards under development such as: 622Mbps, 1.2 & 2.4Gbps ATM



Rating:

- UL listed NEC type CMR or MPR as defined in NEC Article 800
- Constructed in accordance with UL Standard 444
- Complies with UL 1666 Vertical Tray Flame Test
- Meets and Exceeds TIA/EIA 568-B.2.1 Category 6 Specifications
- Verified to Category 6 requirements by independent third party testing laboratory

Color Code:

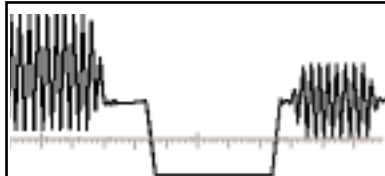
Pair No.	1st Conductor	2nd Conductor
1	White/Blue	Blue
2	White/Orange	Orange
3	White/Green	Green
4	White/Brown	Brown

Installation Characteristics:

Cable Weight:	30lbs/1000ft (33kg/km)
Bending Radius:	1" (25.4mm)Min (4x Cable O.D.)
Pulling Tension:	25lbf (110N)
Operating Temp:	-34°C to +60°C (-30°F to +140°F)
Storage Temp:	-34°C to +75°C (-30°F to +167°F)
Installation Temp:	-20°C to +60°C (-4°F to +140°F)

Mechanical Characteristics	
Number of Pairs	4
Awg. Size	24
Conductor Type	Solid Bare Copper
Insulation	Thermoplastic
Nom. Jacket Thickness	.020 in (.51mm)
Nom. O.D.	.227 in. (5.77mm)
Jacket Type Color	Gray, Blue, White, Pink

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Digital Integration Category 6 Cable

Frequency Mhz	ATTENUATION		NEXT		ACR*	PS-NEXT		PS-ACR	ELFEXT	PS-ELFEXT	RL (db)
	db/100m		db/100m		db/100m	db/100m		db/100m	db/100m	db/100m	
	avg.	max.	avg.	min.	min.	avg.	min.	min.	min.	min.	min.
.772	1.6	1.8	90	80.0	78.2	83	78.0	76.2	--	--	--
1.0	1.8	2.0	88	78.3	76.3	81	76.3	74.3	70.0	68.0	20.0
4.0	3.5	3.8	79	69.3	65.5	72	67.3	63.5	58.0	56.0	24.2
8.0	4.9	5.3	75	64.8	59.5	68	62.8	57.5	51.9	49.9	26.3
10.0	5.6	5.9	73	63.3	57.4	66	61.3	55.4	50.0	48.0	27.0
16.0	7.1	7.5	70	60.2	52.7	63	58.2	50.7	45.9	43.9	27.0
20.0	7.9	8.4	69	58.8	50.4	62	56.8	48.4	44.0	42.0	27.0
25.0	8.8	9.4	67	57.3	47.9	60	55.3	45.9	42.0	40.0	26.5
31.25	10.0	10.6	66	55.9	45.3	59	53.9	43.3	40.1	38.1	26.9
62.5	14.3	15.3	61	51.4	36.1	54	49.4	34.1	34.1	32.1	24.2
100.0	18.4	19.7	58	48.3	28.6	51	46.3	26.6	30.0	28.0	23.1
155.0	23.4	25.0	55	45.4	20.4	48	43.4	18.4	26.2	24.2	22.0
200.0	27.0	28.8	54	43.8	15.0	47	41.8	13.0	24.0	22.0	21.4
250.0	30.5	32.6	52	42.3	9.7	45	40.3	7.7	22.0	20.0	20.9
300.0	33.9	36.2	51	41.1	4.9	44	39.1	2.9	20.5	18.5	20.4
350.0	37.0	39.5	50	40.1	.6	43	38.1	--	19.1	17.1	20.1
400.0	40.0	42.7	49	39.3	--	42	37.3	--	--	--	19.7
500.0	45.5	48.6	48	37.8	--	41	35.8	--	--	--	19.2
550.0	48.2	51.5	47	37.2	--	40	35.2	--	--	--	19.0
650.0	53.2	56.8	46	36.1	--	39	35.1	--	--	--	18.6

TIA/EIA 568-B.2-1 CABLE MINIMUM SPECIFICATION: 250Mhz

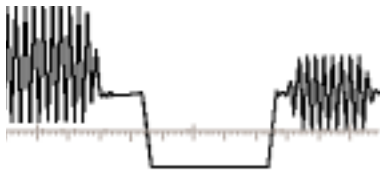
Values above 350Mhz are for Engineering Purposes only

- Attenuation: 32.8dB
- NEXT: 38.3dB
- PS-NEXT: 36.3dB
- ELFEXT: 19.8dB
- PS-ELFEXT: 16.8dB
- Return Loss 17.3dB

WEST PENN WIRE

2833 West Chestnut Street
Washington, Pennsylvania 15301

Phone: 1-800-245-4964
Fax: 724-222-6420

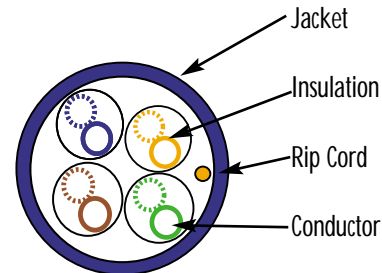


Digital Integration Category 6 Cable Plenum

Rev.1. 10/03

Description:

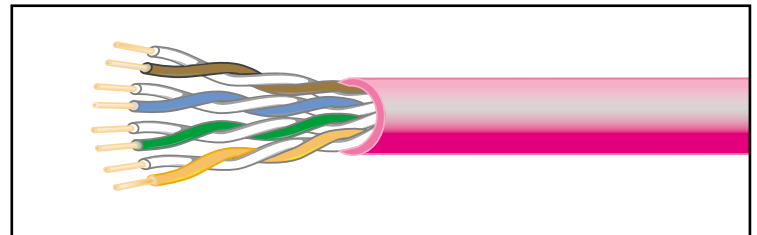
- Multiple pair Category 6 cable
- Enhanced UTP Category Cable
- 4 pair 24AWG unshielded
- FEP- Teflon insulation
- Each pair twisted in varied lays
- Thermoplastic Plenum jacket



Applications:

High performance horizontal wiring that meets or exceeds industry standards for:

- Analog and Digital voice systems
- Intercom systems
- Security (CCTV) systems
- 10 Base-T, 100 Base-T, and 1000 Base-T
- FDDI TP-PMD
- 16Mbps Token Ring
- Home Networking
- ATM 155Mbps
- 550 Mhz Broadband video and standards under development such as: 622Mbps, 1.2 & 2.4Gbps ATM



Rating:

- UL listed NEC type CMP or MPP as defined in NEC Article 800
- Constructed in accordance with UL Standard 444
- Complies with UL 910 Steiner Tunnel Test
- Meets and Exceeds TIA/EIA 568-B.2.1 Category 6 Specifications
- Verified to Category 6 requirements by independent third party testing laboratory

Installation Characteristics:

Cable Weight:	29lbs/1000ft (33kg/km)
Bending Radius:	1" (25.4mm)Min (4x Cable O.D.)
Pulling Tension:	25lbf (110N)
Operating Temp:	-34°C to +60°C (-30°F to +140°F)
Storage Temp:	-34°C to +75°C (-30°F to +167°F)
Installation Temp:	-20°C to +60°C (-4°F to +140°F)

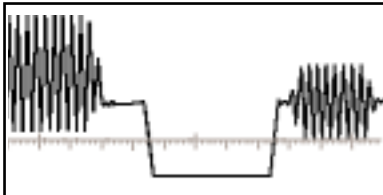
Color Code:

Pair No.	1st Conductor	2nd Conductor
1	White/Blue	Blue
2	White/Orange	Orange
3	White/Green	Green
4	White/Brown	Brown

Mechanical Characteristics	
Number of Pairs	4
Awg. Size	24
Conductor Type	Solid Bare Copper
Insulation	FEP- Teflon
Nom. Jacket Thickness	.020 in (.51mm)
Nom. O.D.	.208 in. (5.28mm)
Jacket Type Color	Gray, Blue, White, Pink

** Teflon is a registered trademark of Dupont

WEST PENN WIRE



254246

**Digital Integration Category 6 Cable
Plenum**

Frequency Mhz	ATTENUATION		NEXT		ACR*	PS-NEXT		PS-ACR	ELFEXT	PS-ELFEXT	RL (db)
	db/100m		db/100m		db/100m	db/100m		db/100m	db/100m	db/100m	
	avg.	max.	avg.	min.	min.	avg.	min.	min.	min.	min.	min.
.772	1.6	1.8	90	80.0	78.2	83	78.0	76.2	--	--	--
1.0	1.8	2.0	88	78.3	76.3	81	76.3	74.3	70.0	68.0	20.0
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25.0	8.8	9.4	67	57.3	47.9	60	55.3	45.9	42.0	40.0	26.5
31.25	10.0	10.6	66	55.9	45.3	59	53.9	43.3	40.1	38.1	26.9
62.5	14.3	15.3	61	51.4	36.1	54	49.4	34.1	34.1	32.1	24.2
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155.0	23.4	25.0	55	45.4	20.4	48	43.4	18.4	26.2	24.2	22.0
200.0	27.0	28.8	54	43.8	15.0	47	41.8	13.0	24.0	22.0	21.4
250.0	30.5	32.6	52	42.3	9.7	45	40.3	7.7	22.0	20.0	20.9
300.0	33.9	36.2	51	41.1	4.9	44	39.1	2.9	20.5	18.5	20.4
350.0	37.0	39.5	50	40.1	.6	43	38.1	--	19.1	17.1	20.1
400.0	40.0	42.7	49	39.3	--	42	37.3	--	--	--	19.7
500.0	45.5	48.6	48	37.8	--	41	35.8	--	--	--	19.2
550.0	48.2	51.5	47	37.2	--	40	35.2	--	--	--	19.0
650.0	53.2	56.8	46	36.1	--	39	35.1	--	--	--	18.6

TIA/EIA 568-B.2-1 CABLE MINIMUM SPECIFICATION: 250Mhz

Values above 350Mhz are for Engineering Purposes only

- Attenuation: 32.8dB
- NEXT: 38.3dB
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- Return Loss 17.3dB

WEST PENN WIRE

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Phone: 1-800-245-4964
Fax: 724-222-6420

MEASUREMENTS:

Insertion Loss:

The measurement of the signal loss resulting from the insertion of a cable length between a transmitter and a receiver. (Referred to as Attenuation)

Near End Cross-talk (NEXT):

The measurement of the unwanted signal coupling from a transmitter at the near end into a neighboring pair at the near end.

Power Sum Near End Cross-talk (PS-NEXT):

PS-NEXT takes into account the combined cross-talk (statistical) on a receive pair from all near-end distributors operating simultaneously.

Equal-Level Far End Cross-talk: (ELFEXT):

FEXT is a measure of the unwanted signal coupling from a transmitter at the far-end into neighboring pairs at the near-end. ELFEXT is measured as the difference between the measured FEXT loss and the insertion loss of the distributed pair.

Power Sum Equal Level Far End Cross-talk:

PS-ELFEXT loss takes into account the combined cross-talk (statistical) on a receive pair from all far-end distributors operating simultaneously.

Combined noise caused by the far end transmitters on the fourth near-end receiving pair.

Return Loss:

Noise source that emerges when full duplex transmission is used. When a transmitter injects a signal onto a wire pair, any reflection of that signal can become noise.

INSTALLATION CONSIDERATIONS:

Pulling The Cable:

Single category 5E/6 has a pull tension of 25lbf

Bending The Cable:

4 x the cable O.D. Roughly around 1 inch bend radius.

Securing the Cable:

Do not cinch the cable tightly with tie-wraps

Do not use staples

CONNECTORIZATION:

Copper Cable Termination Techniques:

UTP Cables:

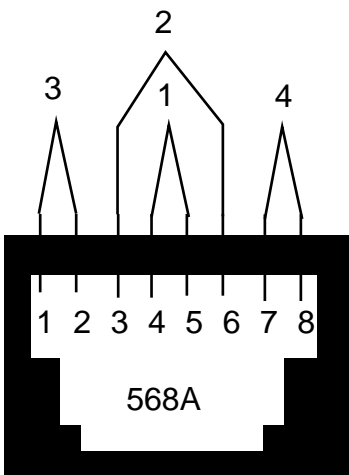
The proper termination of media is vital to the transfer of information whether it be analog or digital.

- IDC- Insulation Displacement Connector-
 - Only method recognized for data cables.
 - This method removes the insulation that covers the conductor to create a connection. During termination the cable is pressed between two metal clips that displace the insulation and exposed the conductor
- Screw type shall never be used for data terminations.

Pre-Termination:

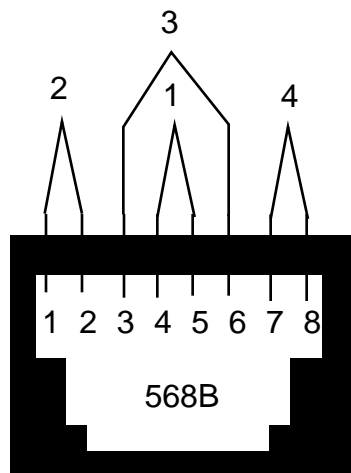
Knowing the wiring scheme. With IDC there are three predominate wiring schemes.

- 568A
 - 568B
 - USOC- Universal standard of connectors
- The 568A and 568B are recognized by the standard.



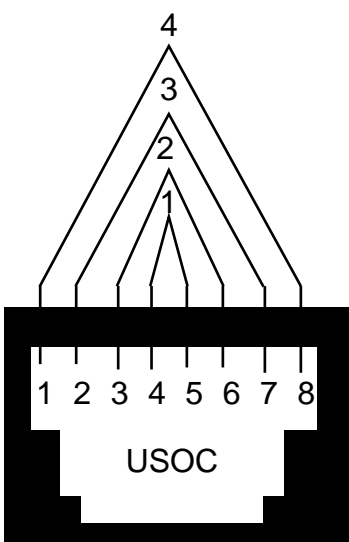
568A

Pair 1 -- Pin 4 Blue - Pin 5 W/Blue
Pair 2 -- Pin 3 W/Orange - Pin 6 Orange
Pair 3 -- Pin 1 W/Green - Pin 2 Green
Pair 4 -- Pin 7 W/Brown - Pin 8 Brown



568B

Pair 1 -- Pin 4 Blue - Pin 5 W/Blue
Pair 2 -- Pin 1 W/Orange - Pin 2 Orange
Pair 3 -- Pin 3 W/Green - Pin 6 Green
Pair 4 -- Pin 7 W/Brown - Pin 8 Brown



INSTALLATION CONSIDERATIONS:

Rough-in Correctly:

- Always make a quick check for shorts, opens, and grounds
- Do not splice
- Do not exceed 25lbf of pulling tension
- Do not run cables in parallel with power wiring
- Do not bend sharply
- Use tie-wraps (Velcro) or plastic staples
- Avoid undercarpet runs
- Keep away from sources of heat
- Leave 18" of spare wire at the outlets and other connection points
- Star topology
- Do not exceed 295ft for Horizontal Links
- Do not exceed 328ft for Horizontal Channels

Signal Separation:

- Never be parallel to power for more than 6"
- Never be closer than 1ft to HIV lights
- Never be closer than 3.5ft to transformers/motors
- Cross power cables at 90°

Pulling Cables in Open Ceilings:

- Support Rings
- J-hooks Used for small amounts of cable
- Bridle rings Every 4-6 ft.
- Beam clamp

Cables must not be stretched tightly around corners or cinched with tightly with tie wraps. The cable will stretch and the electrical characteristics will be effected.

Pulling cables in Conduit:

Conduit pathways for horizontal cables are usually designed to be parallel or perpendicular to the building structure.

Pulling cable through these pathways usually requires the installation of a pull string or rope and lubricants.

Use proper size conduit, do not exceed fill ratio.