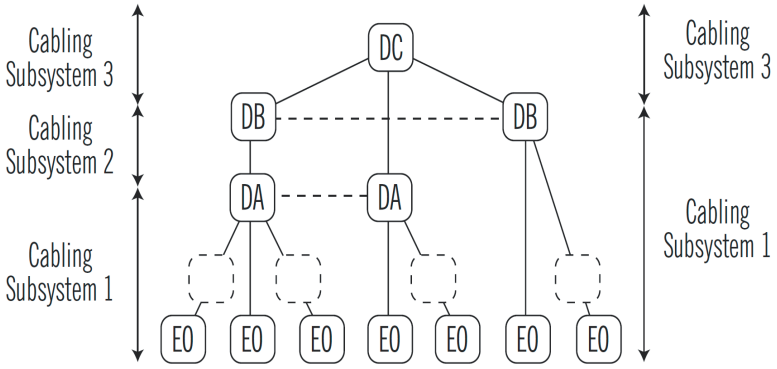
ANSI/TIA 568C Standard

Functional Elements:

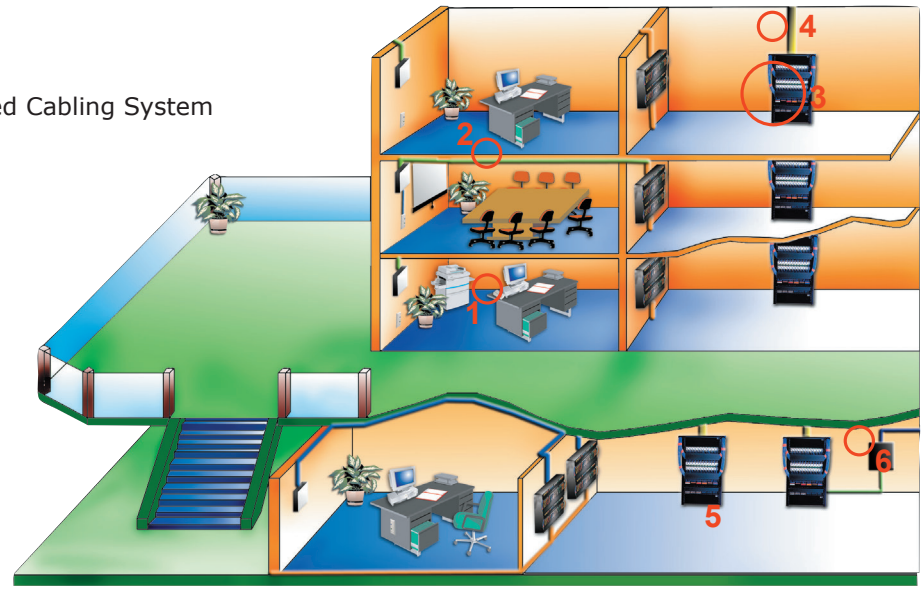
In a typical commercial building where ANSI/TIA-568-C.1 applies, Distributor C represents the main cross-connect (MC) or Equipment Room, Distributor B represents the intermediate cross-connect (IC) or Telecommunuications Closet, Distributor A represents the horizontal cross-connect (HC) or Horizontal Cabling, and the equipment outlet (EO) represents the telecommunications outlet and connector.



Design Considerations:

The Six Subsystems of a Structured Cabling System

1. Work Area
2. Horizontal cabling
3. Telecommunications Closet
4. Backbone Cabling
5. Equipment Room
6. Building Entrance

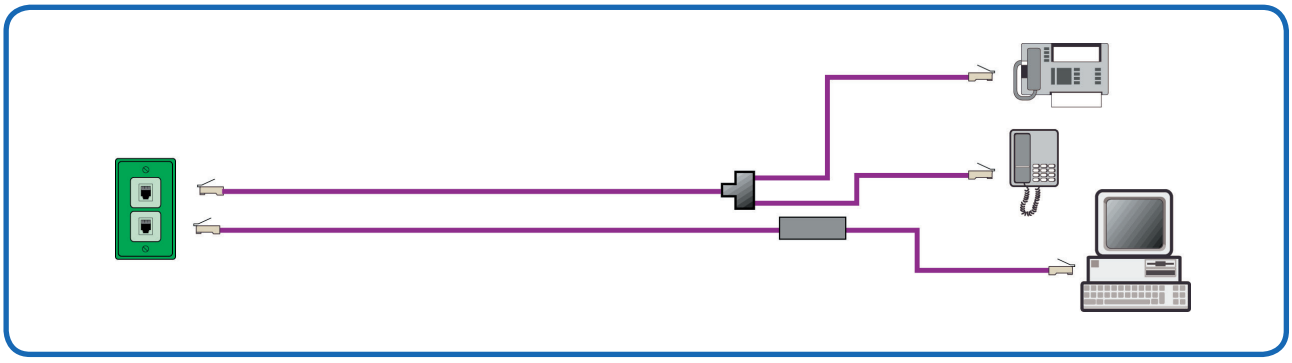


1.Work Area (Not considered as being part of Cabling Subsystem 1,2 or 3)

The work area components extend from the Equipment Outlet (EO) to the station equipment. Work area wiring is designed to be relatively simple to interconnect so that shifting, adding and changing cables is easily managed.

Work Area Components:

- Station Equipment-computers, data terminals, telephones, etc.
- Patch Cables-modular cords, PC adapter cables, fiber jumpers, etc.
- Adapters-baluns, etc. must be external to telecommunications outlet.



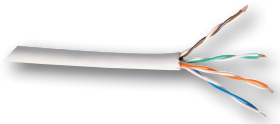
2.Horizontal Cabling (Specified Topology:Star)

The horizontal cabling system extends from the work area telecommunications (information) outlet to the telecommunications closet and consists of the following:

- Horizontal cables
- The telecommunications outlet/connector
- Mechanical terminations in the telecommunications closet
- Patch cords or jumpers in the telecommunications closet

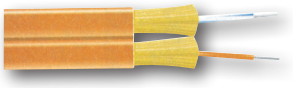
Recognized Media:

- 4-pair 100 ohm unshielded twisted pair (UTP)

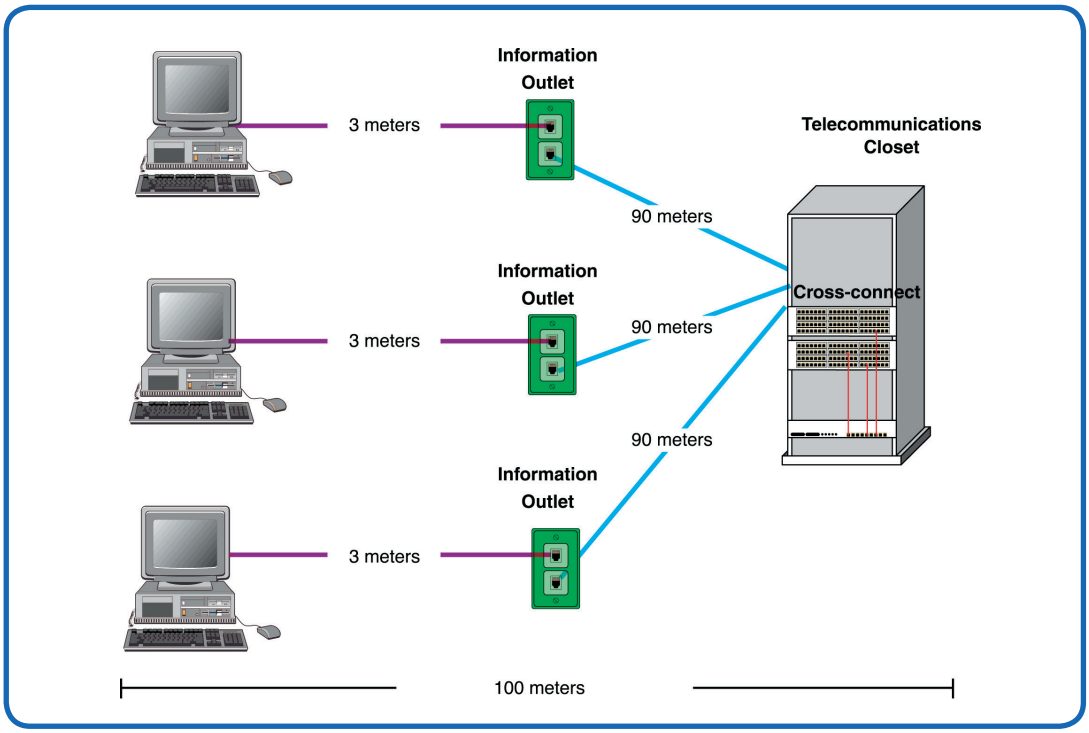


- 2-pair 150 ohm shielded twisted pair (STP-A)

- 2-fiber multimode optical fiber

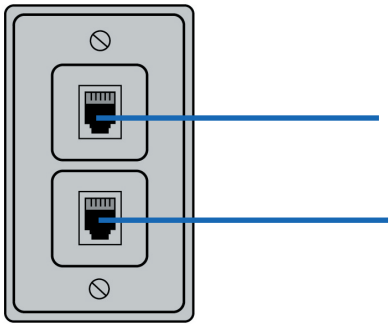


Maximum Distances for Horizontal Cabling:



In addition to the 90 meters of horizontal cable, a total of 10 meters is allowed for work area and telecommunications closet patch and jumper cables.

Telecommunicaton Outlet / Connectors:

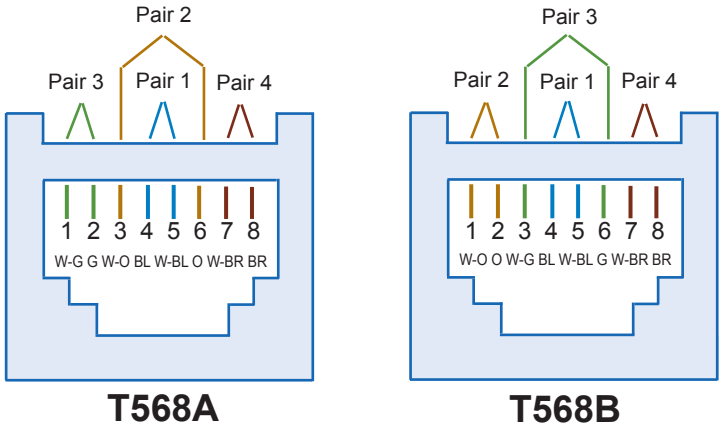


100 ohm UTP 4-pair for Voice T568A or T568B wiring

100 ohm UTP 4-pair
150 ohm STP 2-pair or multimode fiber for data

A minimum of two telecommunications outlet/connectors are required at each work area.

8-Position Modular Jack Pair Assignments for UTP:

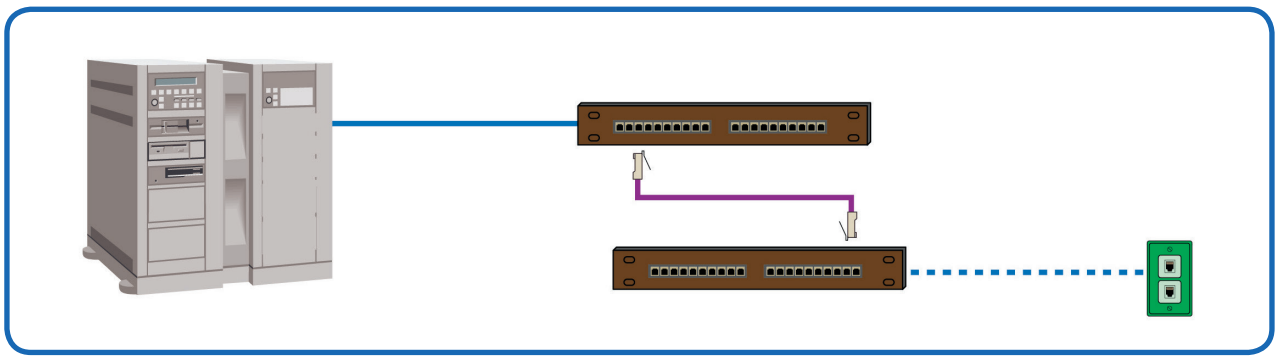


3.Telecommunication Closet

A telecommunication closet is the area within a building that houses the telecommunications cabling system equipment. This includes the mechanical terminations and/or cross-connect for the horizontal and backbone cabling system. Please refer to ANSI/TIA-569-B for the pathway and space design specifications of the telecommunications closet.

Cross-connections:

- ⇢ Equipment cables that consolidate several ports on a single connector (ie:25-pair hub) are terminated on dedicated connecting hardware (system specific)
- ⇢ The dedicated hardware is then connected directly to horizontal or backbone terminations.



4.Backbone Cabling

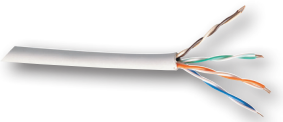
The backbone cabling provides interconnection between telecommunication closets,equipment rooms and entrance facilities.

Includes:

- Backbone cables
- Mechanical terminations in the intermediate and main cross-connections
- Patch cords or jumpers used for backbone-to-bone cross-connection
- Mechanical terminations used to terminate backbone cabling in the horizontal cross-connect.
- Cabling between buildings

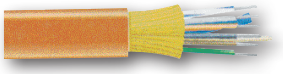
Recognized Media:

- 100 ohm unshielded twisted pair (UTP)

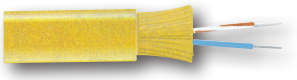


- 150 ohm shielded twisted pair (STP-A)

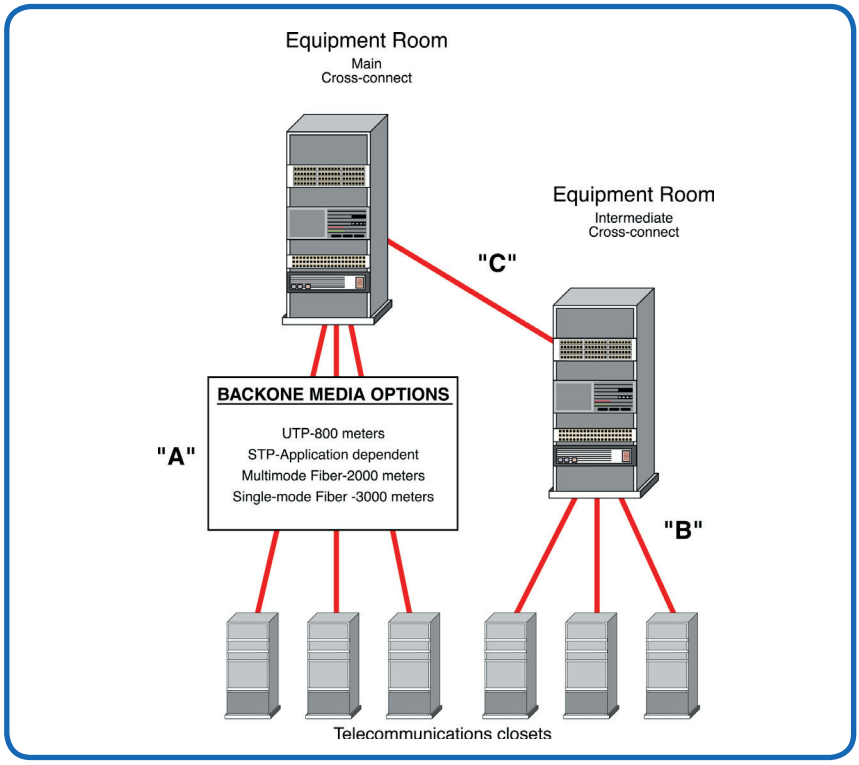
- multi-mode optical fiber



- single-mode optical fiber



Backbone Cabling in Star Topology:



Distances:

⇢ Application dependent:

Cable	"A"	"B"	"C"
62.5/125 um fiber	2,000m(6,560ft)	500m(1,640ft)	1,500m(4,820ft)
50.0/125 um fiber(OM2)	2,000m(6,560ft)	500m(1,640ft)	1,500m(4,820ft)
50.0/125 um fiber(OM3)	2,000m(6,560ft)	500m(1,640ft)	1,500m(4,820ft)
Single-mode fiber	3,000m(9,840ft)	500m(1,640ft)	2,500m(8,200ft)
UTP(voice)	800m(2,624ft)	500m(1,640ft)	300m(984ft)
UTP(data),STP-A	Data applications, limited to 90m(295ft) total		

⇢ Patch cords and cross-connect jumpers at the main cross-connect not to exceed 20m (66ft)

⇢ Patch cords and cross-connect jumpers in the intermediate cross-connect should be 20m(66ft) or less.

⇢ Equipment cables should be 30m (98 ft) or less

⇢ Grounding and bonding must conform to ANSI/TIA-607 as well as applicable authorities or codes.

5.Equipment Room

The design aspects of the equipment room are specified in the ANSI/TIA 569-B standard.
Equipment rooms usually house equipment of higher complexity than telecommunications closet may be provided by an equipment room.

6.Building Entrance

Building entrance facilities provide the point at which outside cabling interfaces with the internal building backbone cabling. The physical requirements of the network interface are defined in the ANSI/TIA-569-B standard. Grounding and bonding must conform to ANSI/TIA-607.

100 Ohm UTP Cabling Systems

The recognized categories of twisted- pair cabling are:

- Category 3: Transmission characteristics are specifical up to 16 MHz
- Category 5e: Transmission characteristics are specifical up to 100 MHz
- Category 6: Transmission characteristics are specifical up to 250 MHz
- Category 6A: Transmission characteristics are specifical up to 500 MHz

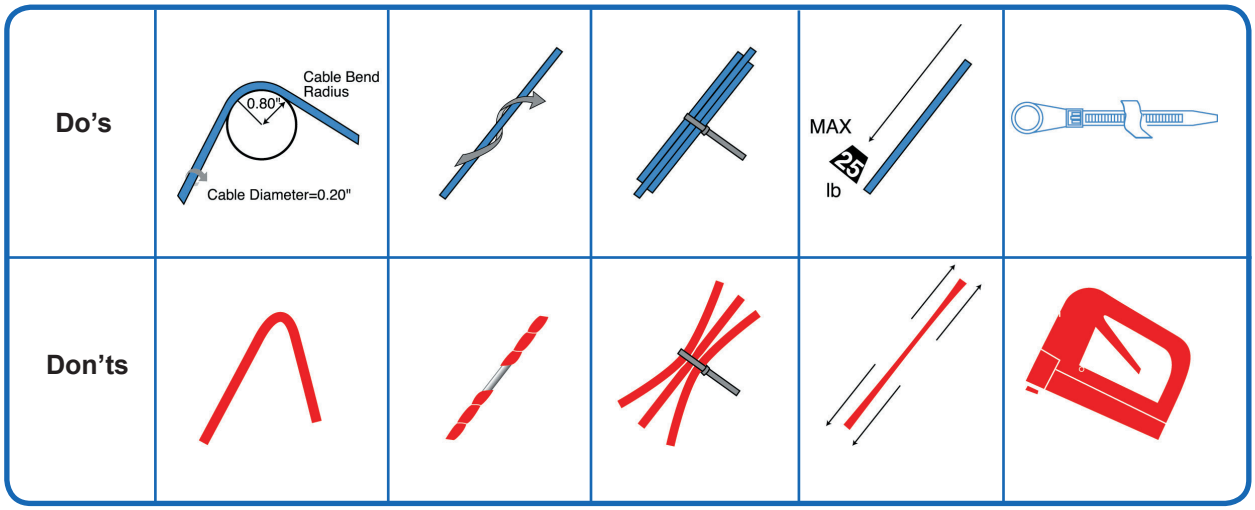
Cable specifications:

- Horizontal: 4 individually twisted pairs
- Backbone: 4-pair or multi-pair
- 24 AWG solid insulated conductors enclosed by jacket exceptions (if requirements are met):
  - Overall foil shield (screened) may be used where required
  - 22 AWG may be used
- Cable diameter must be less than 1/4” (6.35mm) for 4-pair

Patch cords:

- Stranded conductors specified for adequate flexibility.
- Cables must meet horizontal transmission performance requirements (+20% attenuation values allowed)
- Recomended insulated conductor diameter:0.8mm (0.032 in) to 1mm (0.039 in) Max.=1.2mm (0.047 in)
- Terminated either T568A or T568B pair assignment on both ends

Installation Practices:



Channel Link Category 3, 5e, 6 Verification specifications:

Category 3 channel specifications(ANSI/TIA 568-C.2)

MHz	Attenuation (dB)	Next (dB)	PSNEXT (dB)	ELFEXT (dB)	PSELFEXT (dB)	RL (dB)	DELAY ns	DELAY SKEW ns
1.0	3.5	39.1	--	--	--	--	--	--
4.0	6.2	29.3	--	--	--	--	--	--
8.0	8.9	24.3	--	--	--	--	--	--
10.0	9.9	22.7	--	--	--	--	555	50
16.0	13.0	19.3	--	--	--	--	--	--

Category 5e channel specifications(ANSI/TIA 568-C.2)

MHz	Attenuation (dB)	Next (dB)	PSNEXT (dB)	ELFEXT (dB)	PSELFEXT (dB)	RL (dB)	DELAY ns	DELAY SKEW ns
1.0	2.2	>60	>57	57.4	54.4	17.0	--	--
4.0	4.5	53.5	50.5	45.4	42.4	17.0	--	--
8.0	6.3	48.6	45.6	39.3	36.3	17.0	--	--
10.0	7.1	47.0	44.0	37.4	34.4	17.0	555	50
16.0	9.1	43.6	40.6	33.3	30.3	17.0	--	--
20.0	10.2	42.0	39.0	31.4	28.4	17.0	--	--
25.0	11.4	40.3	37.3	29.4	26.4	16.0	--	--
31.25	12.9	38.7	35.7	27.5	24.5	15.1	--	--
62.5	18.6	33.6	30.6	21.5	18.5	12.1	--	--
100.0	24.0	30.1	27.1	17.4	14.4	10.0	--	--

Category 6 channel specifications(ANSI/TIA 568-C.2)

MHz	Attenuation (dB)	Next (dB)	PSNEXT (dB)	ELFEXT (dB)	PSELFEXT (dB)	RL (dB)	DELAY ns	DELAY SKEW ns
1.0	2.1	65.0	62.0	63.3	60.3	19.0	--	--
4.0	4.0	63.0	60.5	51.2	48.2	19.0	--	--
8.0	5.7	58.2	55.6	45.2	42.2	19.0	--	--
10.0	6.3	56.6	54.0	43.3	40.3	19.0	555	50
16.0	8.0	53.2	50.6	39.2	36.2	18.0	--	--
20.0	9.0	51.6	49.0	37.2	34.2	17.5	--	--
25.0	10.1	50.0	47.3	35.3	32.3	17.0	--	--
31.25	11.4	48.4	45.7	33.4	30.4	16.5	--	--
62.5	16.5	43.4	40.6	27.3	24.3	14.0	--	--
100.0	21.3	39.9	37.1	23.3	20.3	12.0	--	--
200.0	31.5	34.8	31.9	17.2	14.2	9.0	--	--
250.0	35.9	33.1	30.2	15.3	12.3	8.0	--	--

Category 6A channel specification(ANSI/TIA 568-C.2)

MHz	Attenuation (dB)	Next (dB)	PSNEXT (dB)	RL (dB)	ACRF (dB)	PSACRF (dB)	PSANEXT (dB)
1.0	2.3	65.0	62.0	19.0	63.3	60.3	67.0
4.0	4.2	63.0	60.5	19.0	51.2	48.2	67.0
8.0	5.8	58.2	55.6	19.0	45.2	42.2	67.0
10.0	6.5	56.6	54.0	19.0	43.3	40.3	67.0
16.0	8.2	53.2	50.6	18.0	39.2	36.2	67.0
20.0	9.2	51.6	49.0	17.5	37.2	34.2	67.0
25.0	10.2	50.0	47.3	17.0	35.3	32.3	66.0
31.25	11.5	48.4	45.7	16.5	33.4	30.4	65.1
62.5	16.4	43.4	40.6	14.0	27.3	24.3	62.0
100.0	20.9	39.9	37.1	12.0	23.3	20.3	60.0
200.0	30.1	34.8	31.9	9.0	17.2	14.2	55.5
250.0	33.9	33.1	30.2	8.0	15.3	12.3	54.0
300.0	37.4	31.7	28.8	7.2	13.7	10.7	52.8
400.0	43.7	28.7	25.8	6.0	11.2	8.2	51.0
500.0	49.3	26.1	23.2	6.0	9.3	6.3	49.5

ANSI/TIA-569-B Standard

Commercial Building Standard for telecommunications Pathways and spaces

Telecommunications Closet

- Dedicated to telecommunications function and support facilities only.
- Minimm of one closet per floor
- Additional closets should be provided for each area up to 1000 m^2 (10,000 ft^2) when:
  - The floor area served exceeds 1000m^2 (10,000 ft^2)
  - The horizontal distance exceeds 90m (300 ft)

Recommended Closet Sizing:

(based on 1 work station per 10 m2 (100ft2)

Serving Area		Closet Sizing	
(m^2)	(ft^2)	(m^2)	(ft^2)
1,000	10,000	3,000 X 3400	10 X 11
1,000	10,000	3,000 X 3400	10 X 11
1,000	10,000	3,000 X 3400	10 X 11

Equipment Room

- Centralized space for telecommunications equipment
- Shall house only equipment directly related to the telecommunications system and its environmental support systems

Sizing:

- To meet known requirements of specific equipment.
- If equipment is unknown, plan for 0.07m^2 (0.75ft^2) of equipment room space for every 10m^2 (100 ft^2) of work station space.
- Must be a minimum of 14m^2 (150ft^2)
- For special-use buildings, size must be based on number of work stations as follows:

Equipment Room Floor space for Special-use Buildings:

Area

Work Stations	(m^2)	(ft^2)
Up to 100	14	150
101 to 400	37	400
401 to 800	74	800
801 to 1200	111	1200

Entrance Facilities

- Consists of the telecommunications service entrance to the building, including the entrance point through the wall, and continuing to the entrance room or space.
- May contain the backbone pathways that link to other buildings in campus environments.
- Sizing:

Minimum Equipment and Termination Wall space:

Gross Floor Space		Wall Length	
(m^2)	(ft^2)	(m^2)	(ft^2)
500	5000	900	39
1000	10000	990	39
2000	20000	1060	42
4000	40000	1725	68
5000	50000	2295	90
6000	60000	2400	96
8000	80000	3015	120
10000	100000	3630	144

ANSI/TIA-606B Standard

The administration standard for the telecommunications infrastructure of commercial buildings.

Telecommunications Administration Areas:

- Terminations
- Media
- Pathways
- Spaces
- Bonding/grounding

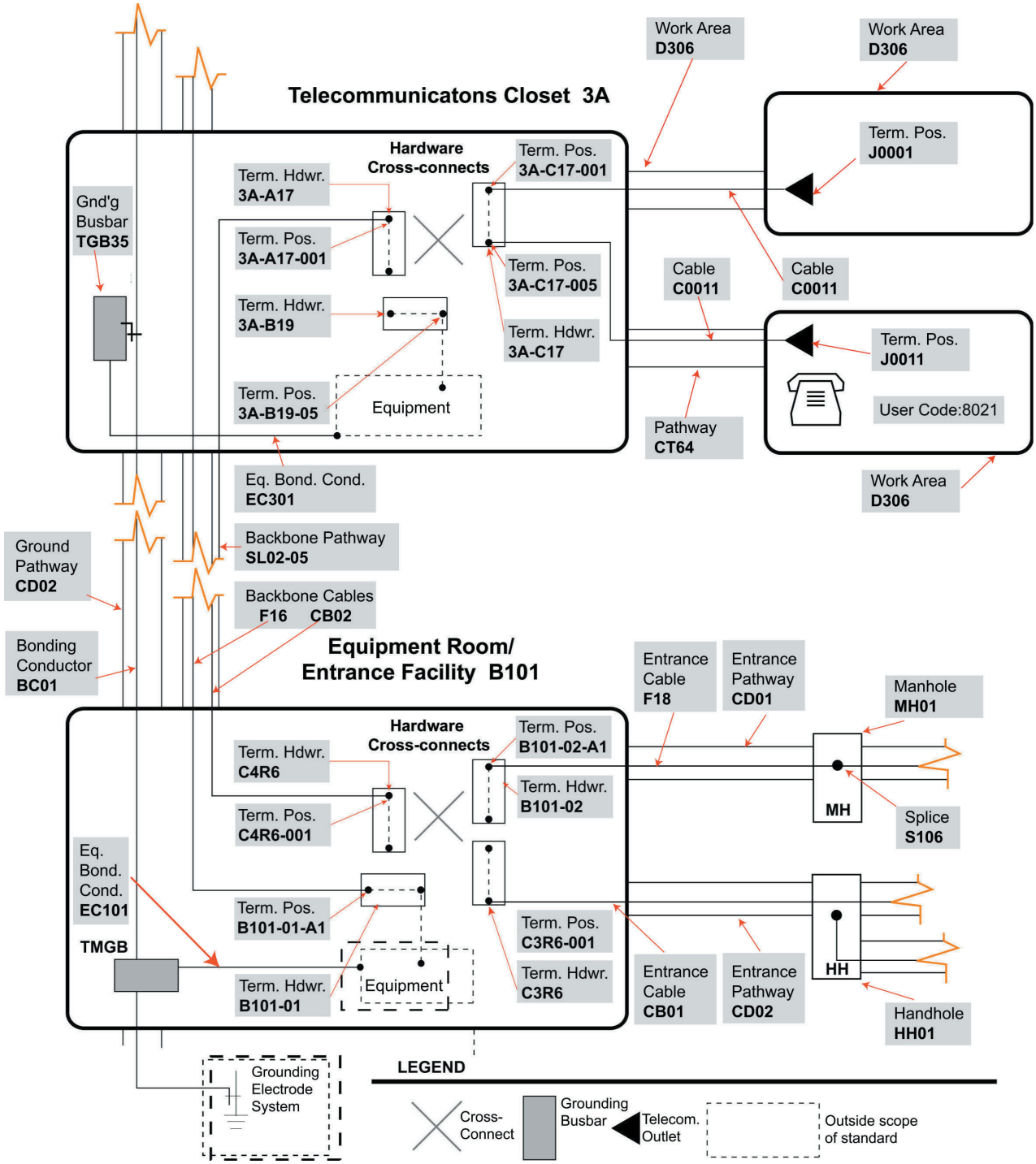
Identifiers:

- Designations assigned to elements of the telecommunications infrastructure.
- Identifiers used to access records of the same type must be unique.
- Encoded identifiers designate the element and provide information about that element.
- Records are the collection of information about or related to a specific eement.
- A typical administration system includes labels, drawings, work orders, records & reports.

Additional specifications:

- Identical cables spliced together must be administered as a single cable
- Each horizontal cable must be labeled at both ends
- Termination hardware containing one or more termination positions (e.g.:patch panel jack) may be administered as one termination position.
- A unique identifier must be assigned to each hardware termination unit
- An identifier must be marked on each termination hardware unit or its label
- Station terminations may be labeled on the faceplate, housing or the connector itself.
- Labels can be adhesive, insert or other special purpose labels. Labels must meet legibility, defacement and adhesion requirements specified in UL969 (D16)

Administration Labeling Map:



ANSI/TIA-607 Standard

Commerical building Grounding and Bonding Requirements for Telecommunications

Description:

The standards can be utilized with or without prior knowledge of the telecommunications systems installed in the building. This standard supports a multi-vendor, multi-product environment, as well as the grounding practices for various systems that may be installed on customer premised. ANSI/TIA-607 will be useful to manufacturers of telecommunications equipment, purchasers, installers, or operators of equipment and devices for specifying the exact interface points between the building grounding systems and the telecommunications equipment grounding configuration, and for specifying building grounding configurations need to support this equipment. ANSI/TIA-607 will also help building owners and developers wyo want to build an advanced technology structure that is compatible with moden telecommunications equipment.

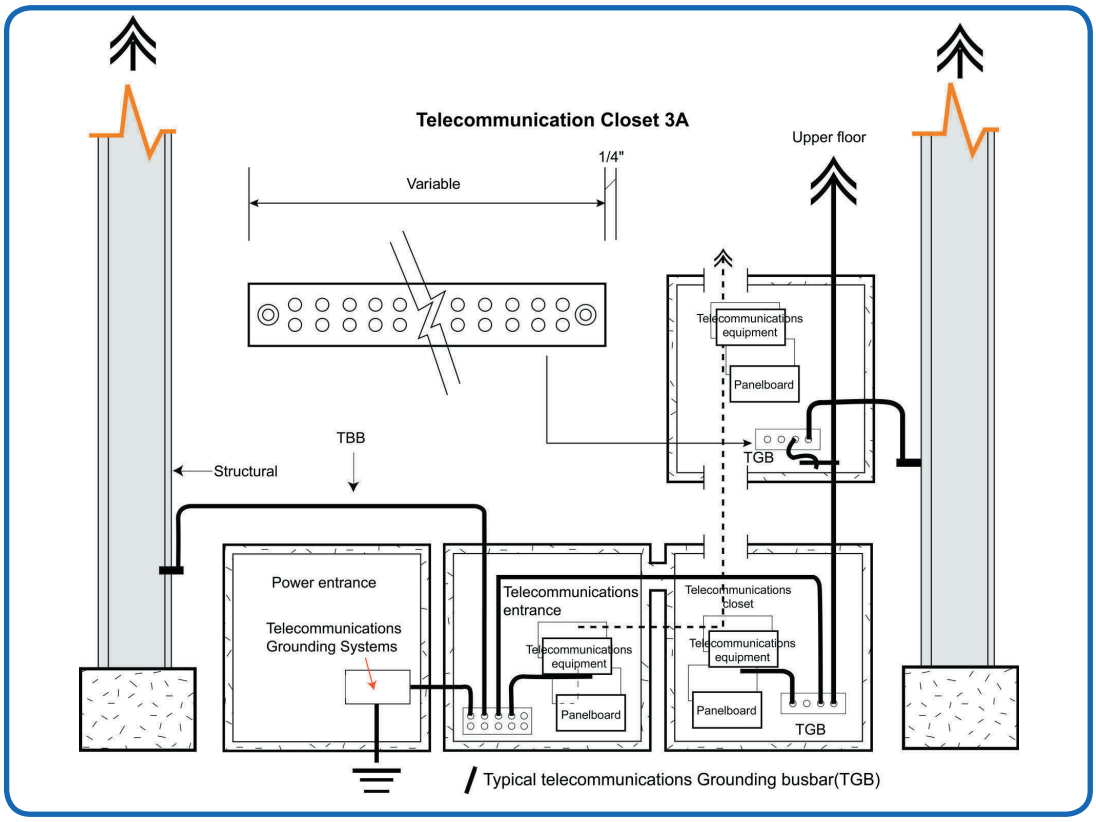
The standard includes specifications for Telecommunications main grounding busbar (TMGB), telecommunications grounding busbar (TGB), bonding conductor for telecommunications, telecommunications bonding backbone (TBB) sizing and bonding.

Telecommunications main grounding busbar (TMGB) refers to a busbar bonded to the service requipment (power) ground by the bonding conductor for telecommunications. The TMGB should be placed in a location that is convenient and accessible.

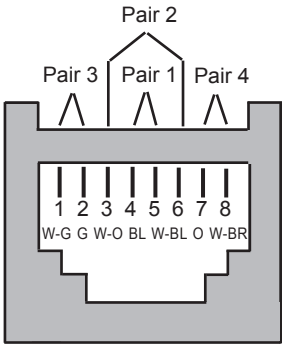
Telecommunications grounding busbar (TGB) is Located in a telecommunications closet or equipment room, it serves as a common central point of connection for telecommunications systems and equipment in the area served by that TC or equipment room.

Telecommunications bonding backbone (TBB) is a copper conductor used to connect the telecommunications main grounding busbar to the telecommunications grounding busbar located on the floor farthest away.

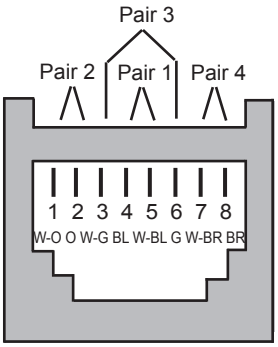
Grounding & Connectivity map:



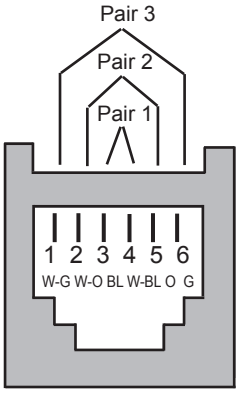
Wiring Schemes(1)



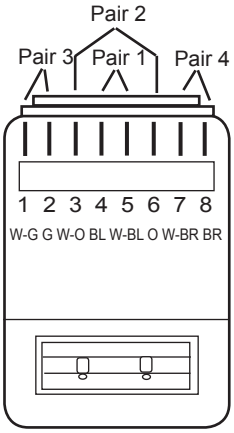
T568A

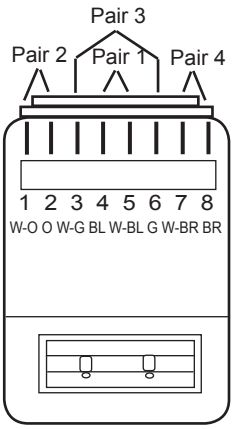


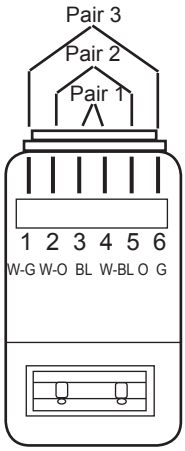
T568B

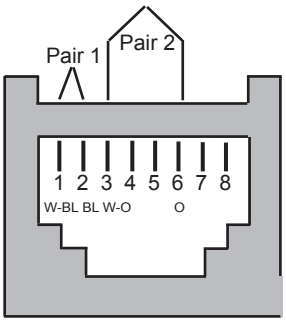


USOC

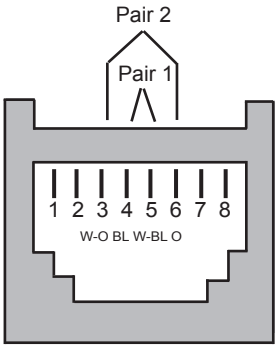




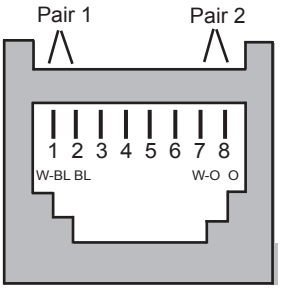




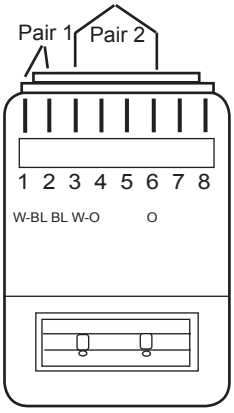
10BASE-T

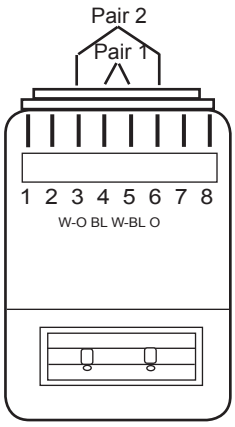


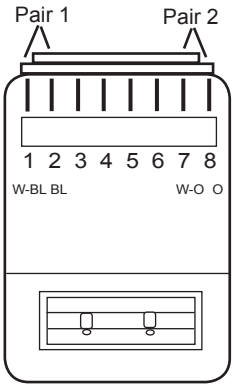
Token Ring



TP-PMD







DINTEK LAN Cabling Systems

Wiring Schemes(2)

25 Pair Cable(Color Code)		Telco pin#	110 pin#	USOC RJ11 6P2C pin#	Pair I D	USOC RJ11 6P4C pin#	Pair I D	USOC RJ11 6P6C pin#	Pair I D	USOC RJ45 8P8C pin#	Pair I D	356A RJ45 8P6C pin#	Pair I D
	White/Blue	26	1	4	T1	4	T1	4	T1	5	T1	5	T1
	Blue/White	1	2	3	R1	3	R1	3	R1	4	R1	4	R1
	White/Orange	27	3	4	T1	2	T2	2	T2	3	T2	1	T2
	Orange/White	2	4	3	R1	5	R2	5	R2	6	R2	2	R2
	White/Green	28	5	4	T1	4	T1	1	T3	2	T3	3	T3
	Green/White	3	6	3	R1	3	R1	6	R3	7	R3	6	R3
	White/Brown	29	7	4	T1	2	T2	4	T1	8	T4	5	T1
	Brown/White	4	8	3	R1	5	R2	3	R1	1	R4	4	R1
	White/Slate	30	9	4	T1	4	T1	2	T2	5	T1	1	T2
	Slate/White	5	10	3	R1	3	R1	5	R2	4	R1	2	R2
	Red/Blue	31	11	4	T1	2	T2	1	T3	3	T2	3	T3
	Blue/Red	6	12	3	R1	5	R2	6	R3	6	R2	6	R3
	Red/Orange	32	13	4	T1	4	T1	4	T1	2	T3	5	T1
	Orange/Red	7	14	3	R1	3	R1	3	R1	7	R3	4	R1
	Red/Green	33	15	4	T1	2	T2	2	T2	8	T4	1	T2
	Green/Red	8	16	3	R1	5	R2	5	R2	1	R4	2	R2
	Red/Brown	34	17	4	T1	4	T1	1	T3	5	T1	3	T3
	Brown/Red	9	18	3	R1	3	R1	6	R3	4	R1	6	R3
	Red/Slate	35	19	4	T1	2	T2	4	T1	3	T2	5	T1
	Slate/Red	10	20	3	R1	5	R2	3	R1	6	R2	4	R1
	Black/Blue	36	21	4	T1	4	T1	2	T2	2	T3	1	T2
	Blue/Black	11	22	3	R1	3	R1	5	R2	7	R3	2	R2
	Black/Orange	37	23	4	T1	2	T2	1	T3	8	T4	3	T3
	Orange/Black	12	24	3	R1	5	R2	6	R3	1	R4	6	R3
	Black/Green	38	25	4	T1	4	T1	4	T1	5	T1	5	T1
	Green/Black	13	26	3	R1	3	R1	3	R1	4	R1	4	R1
	Black/Brown	39	27	4	T1	2	T2	2	T2	3	T2	1	T2
	Brown/Black	14	28	3	R1	5	R2	5	R2	6	R2	2	R2
	Black/Slate	40	29	4	T1	4	T1	1	T3	2	T3	3	T3
	Slate/Black	15	30	3	R1	3	R1	6	R3	7	R3	6	R3
	Yellow/Blue	41	31	4	T1	2	T2	4	T1	8	T4	5	T1
	Blue/Yellow	16	32	3	R1	5	R2	3	R1	1	R4	4	R1
	Yellow/Orange	42	33	4	T1	4	T1	2	T2	5	T1	1	T2
	Orange/Yellow	17	34	3	R1	3	R1	5	R2	4	R1	2	R2
	Yellow/Green	43	35	4	T1	2	T2	1	T3	3	T2	3	T3
	Green/Yellow	18	36	3	R1	5	R2	6	R3	6	R2	6	R3
	Yellow/Brown	44	37	4	T1	4	T1	4	T1	2	T3	5	T1
	Brown/Yellow	19	38	3	R1	3	R1	3	R1	7	R3	4	R1
	Yellow/Slate	45	39	4	T1	2	T2	2	T2	8	T4	1	T2
	Slate/Yellow	20	40	3	R1	5	R2	5	R2	1	R4	2	R2
	Violet/Blue	46	41	4	T1	4	T1	1	T3	5	T1	3	T3
	Blue/Violet	21	42	3	R1	3	R1	6	R3	4	R1	6	R3
	Violet/Blue	47	43	4	T1	2	T2	4	T1	3	T2	5	T1
	Blue/Violet	22	44	3	R1	5	R2	3	R1	6	R2	4	R1
	Violet/Green	48	45	4	T1	4	T1	2	T2	2	T3	1	T2
	Green/Violet	23	46	3	R1	3	R1	5	R2	7	R3	2	R2
	Violet/Brown	49	47	4	T1	2	T2	1	T3	8	T4	3	T3
	Brown/Violet	24	48	3	R1	5	R2	6	R3	1	R4	6	R3
	Violet/Slate	50	49	-	-	-	-	-	-	-	-	-	-
	Slate/Violet	25	50	-	-	-	-	-	-	-	-	-	-
# of Module Jacks per Telco Connector				24		12		8		6		8	

DINTEK LAN Cabling Systems

Wiring Schemes(3)

25 Pair Cable(Color Code)		Telco pin#	110 pin#	10 Base-T RJ45 8P4C pin#	10 Base-T RJ45 Pair I D	568B(258A) RJ45 8P8C pin#	568B(258A) RJ45 Pair I D	568A RJ45 8P8C pin#	568A RJ45 Pair I D	DEC MMJ 6P4C pin#	DEC MMJ Pair I D	DEC MMJ 6P6C pin#	DEC MMJ Pair I D
	White/Blue	26	1	1	T2	5	T1	5	T1	2	T1	4	T1
	Blue/White	1	2	2	R2	4	R1	4	R1	3	R1	3	R1
	White/Orange	27	3	3	T3	1	T2	3	T2	5	T2	4	T2
	Orange/White	2	4	6	R3	2	R2	6	R2	4	R2	3	R2
	White/Green	28	5	1	T2	3	T3	1	T3	1	T1	4	T3
	Green/White	3	6	2	R2	6	R3	2	R3	6	R1	3	R3
	White/Brown	29	7	3	T3	7	T4	7	T4	2	T2	4	T1
	Brown/White	4	8	6	R3	8	R4	8	R4	3	R2	3	R1
	White/Slate	30	9	1	T2	5	T1	5	T1	5	T1	4	T2
	Slate/White	5	10	2	R2	4	R1	4	R1	4	R1	3	R2
	Red/Blue	31	11	3	T3	1	T2	3	T2	1	T2	4	T3
	Blue/Red	6	12	6	R3	2	R2	6	R2	6	R2	3	R3
	Red/Orange	32	13	1	T2	3	T3	1	T3	2	T1	4	T1
	Orange/Red	7	14	2	R2	6	R3	2	R3	3	R1	3	R1
	Red/Green	33	15	3	T3	7	T4	7	T4	5	T2	4	T2
	Green/Red	8	16	6	R3	8	R4	8	R4	4	R2	3	R2
	Red/Brown	34	17	1	T2	5	T1	5	T1	1	T1	4	T3
	Brown/Red	9	18	2	R2	4	R1	4	R1	6	R1	3	R3
	Red/Slate	35	19	3	T3	1	T2	3	T2	2	T2	4	T1
	Slate/Red	10	20	6	R3	2	R2	6	R2	3	R2	3	R1
	Black/Blue	36	21	1	T2	3	T3	1	T3	5	T1	4	T2
	Blue/Black	11	22	2	R2	6	R3	2	R3	4	R1	3	R2
	Black/Orange	37	23	3	T3	7	T4	7	T4	1	T2	4	T3
	Orange/Black	12	24	6	R3	8	R4	8	R4	6	R2	3	R3
	Black/Green	38	25	1	T2	5	T1	5	T1	2	T1	4	T1
	Green/Black	13	26	2	R2	4	R1	4	R1	3	R1	3	R1
	Black/Brown	39	27	3	T3	1	T2	3	T2	5	T2	4	T2
	Brown/Black	14	28	6	R3	2	R2	6	R2	4	R2	3	R2
	Black/Slate	40	29	1	T2	3	T3	1	T3	1	T1	4	T3
	Slate/Black	15	30	2	R2	6	R3	2	R3	6	R1	3	R3
	Yellow/Blue	41	31	3	T3	7	T4	7	T4	2	T2	4	T1
	Blue/Yellow	16	32	6	R3	8	R4	8	R4	3	R2	3	R1
	Yellow/Orange	42	33	1	T2	5	T1	5	T1	5	T1	4	T2
	Orange/Yellow	17	34	2	R2	4	R1	4	R1	4	R1	3	R2
	Yellow/Green	43	35	3	T3	1	T2	3	T2	1	T2	4	T3
	Green/Yellow	18	36	6	R3	2	R2	6	R2	6	R2	3	R3
	Yellow/Brown	44	37	1	T2	3	T3	1	T3	2	T1	4	T1
	Brown/Yellow	19	38	2	R2	6	R3	2	R3	3	R1	3	R1
	Yellow/Slate	45	39	3	T3	7	T4	7	T4	5	T2	4	T2
	Slate/Yellow	20	40	6	R3	8	R4	8	R4	4	R2	3	R2
	Violet/Blue	46	41	1	T2	5	T1	5	T1	1	T1	4	T3
	Blue/Violet	21	42	2	R2	4	R1	4	R1	6	R1	3	R3
	Violet/Blue	47	43	3	T3	1	T2	3	T2	2	T2	4	T1
	Blue/Violet	22	44	6	R3	2	R2	6	R2	3	R2	3	R1
	Violet/Green	48	45	1	T2	3	T3	1	T3	5	T1	4	T2
	Green/Violet	23	46	2	R2	6	R3	2	R3	4	R1	3	R2
	Violet/Brown	49	47	3	T3	7	T4	7	T4	1	T2	4	T3
	Brown/Violet	24	48	6	R3	8	R4	8	R4	6	R2	3	R3
	Violet/Slate	50	49	-	-	-	-	-	-	-	-	-	-
	Slate/Violet	25	50	-	-	-	-	-	-	-	-	-	-
# of Module Jacks per Telco Connector				12		6		6		12		8	