

The Purpose of ANSI/TIA/EIA-942

Telecommunications Infrastructure Standard for Data Centers

- The purpose of this standard is to provide requirements and guidelines for the design and installation of a data center or computer room.
- It is intended for designers who need a comprehensive understanding of the data center design including the facility planning, the cabling system, and the network design.
- It facilitates the planning for data centers to occur earlier in the building development process (architectural, facilities, and IT).

Data centers support a wide range of transmission protocols. Some of these protocols impose distance restrictions that are shorter than those imposed by this standard. When applying specific transmission protocols, consult standards, regulations, equipment vendors, and system service suppliers for applicability, limitations, and ancillary requirements. Consider consolidating standardized and proprietary cabling into a single structured cabling system.

The Standard Specifies:

- Cabling design
- Network design
- Facilities design
- Informative annexes containing “best practices” and availability requirements
- Spaces
- Pathways
- Racks/cabinets

Section Contents

ANSI/TIA/EIA-942

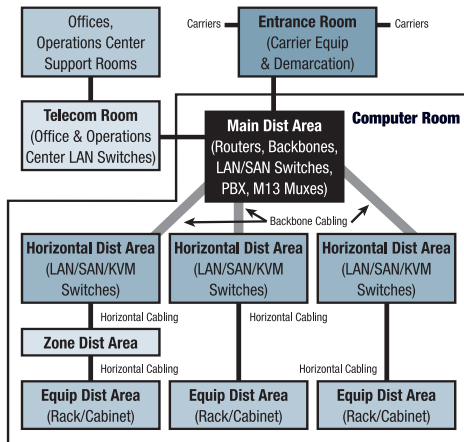
Telecommunications Infrastructure Standard for Data Centers

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Data Center Cabling Infrastructure

The basic elements of the data center cabling system structure are the following:

- Horizontal cabling
- Backbone cabling
- Cross-connect in the entrance room or main distribution area
- Main Cross-Connect (MC) in the main distribution area
- Horizontal Cross-Connect (HC) in the telecommunications room, horizontal distribution area or main distribution area.
- Zone outlet or consolidation point in the zone distribution area
- Outlet in the equipment distribution area

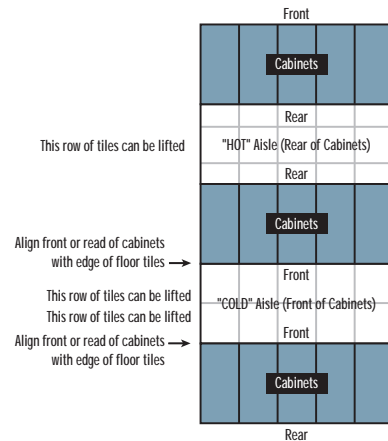


Hot and Cold Aisles

Cabinets and racks shall be arranged in an alternating pattern, with fronts of cabinets/racks facing each other in a row to create “hot” and “cold” aisles. Cold aisles are in front of racks and cabinets. If there is an access floor, power distribution cables should be installed here under the access floor on the slab. Hot aisles are behind racks and cabinets. If there is an access floor, cable trays for telecommunications cabling should be located under the access floor in the hot aisles.

A minimum of 1 m (3 ft) of front clearance shall be provided for installation of equipment. A front clearance of 1.2 m (4 ft) is preferable to accommodate deeper equipment. A minimum of 0.6 m (2 ft) of rear clearance shall be provided for service access at the rear of racks and cabinets.

A rear clearance of 1 m (3 ft) is preferable. Some equipment may require service clearances of greater than 1 m (3 ft).



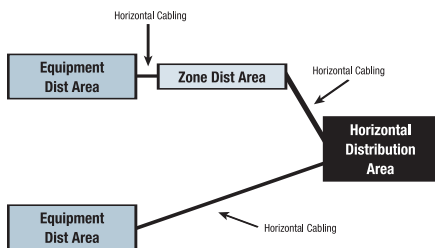
Hot and Cold Aisles

Horizontal Cabling

The horizontal cabling is the portion of the telecommunications cabling system that extends from the mechanical termination in the equipment distribution area to either the horizontal cross-connect in the horizontal distribution area or the main cross-connect in the main distribution area. The horizontal cabling includes horizontal cables, mechanical terminations, and patch cords or jumpers, and may include a zone outlet or a consolidation point in the zone distribution area.

The following partial listing of common services and systems should be considered when the horizontal cabling is designed:

- Voice, modem and facsimile telecommunications service
- Premises switching equipment
- Computer and telecommunications management connections
- Keyboard/Video/Mouse (KVM) connections
- Data communications
- Wide Area Networks (WAN)
- Local Area Networks (LAN)
- Storage Area Networks (SAN)
- Other building signaling systems (building automation systems such as fire, security, power, HVAC, etc.).

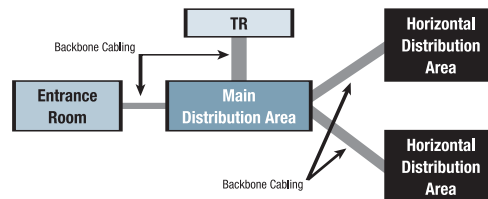


Horizontal Cabling Using Star Topology

Length of Horizontal Cable (ft)	24 AWG UTP/24 ScTP Patch Cords		26 AWG ScTP Patch Cords	
	Maximum Length of Zone Area Cable (Z)	Maximum Combined Length of Zone Area Cables, Patch Cords and Equipment (C)	Maximum Length of Zone Area Cable (Z)	Maximum Combined Length of Zone Area Cables, Patch Cords and Equipment Cable (C)
m (ft)	m (ft)	m (ft)	m (ft)	m (ft)
90 (295)	5 (16)	10 (33)	4 (13)	8 (26)
85 (279)	9 (30)	14 (46)	7 (23)	11 (35)
80 (262)	13 (44)	18 (59)	11 (35)	15 (49)
75 (246)	17 (57)	22 (72)	14 (46)	18 (59)
70 (230)	22 (72)	27 (89)	17 (56)	21 (70)

Backbone Cabling

The function of the backbone cabling is to provide connections between the main distribution area, the horizontal distribution area and entrance facilities in the data center cabling system. Backbone cabling consists of the backbone cables, main cross-connects, horizontal cross-connects, mechanical terminations and patch cord or jumpers used for backbone-to-backbone cross-connection.



Backbone Cabling Using Star Topology

Recognized Cabling Media for Horizontal and Backbone Applications

Recognized cables, associated connecting hardware, jumpers, patch cords, equipment cords and zone area cords shall meet all applicable requirements specified in ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.3.

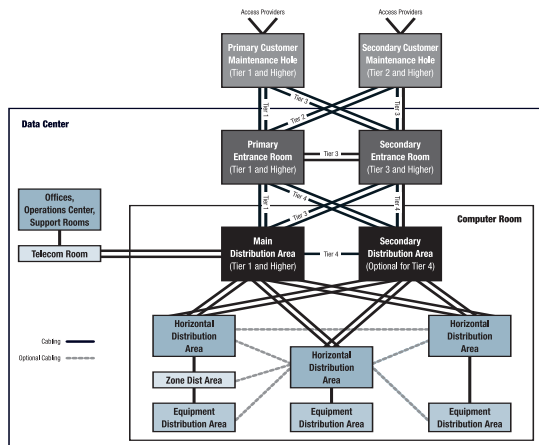
- 100 ohm twisted-pair cable (ANSI/TIA/EIA-568-B.2), Category 6 recommended (ANSI/TIA/EIA-568-B.2-1)
- Multimode optical fiber cable, either 62.5/125 μ or 50/125 μ (ANSI/TIA/EIA-568-B.3), 50/125 μ 850 nm laser optimized multimode fiber is recommended (ANSI/TIA-568-B.3-1)
- Single-mode optical fiber cable (ANSI/TIA/EIA-568-B.3).
- The recognized coaxial media are 75 ohm (734 and 735 type) coaxial cable (Telcordia Technologies GR-139-CORE) and coaxial connector (ANSI T1.404).

Redundancy

Data centers that are equipped with diverse telecommunications facilities may be able to continue their function under catastrophic conditions that would otherwise interrupt the data center's telecommunications service. This standard includes four tiers relating to various levels of availability of the data center facility infrastructure. The tiers are related to research conducted by the Uptime Institute, which define four tiers of performance as defined in the following table.

	Tier I: Basic	Tier II: Redundant Components	Tier III: Concurrently Maintainable	Tier IV: Fault Tolerant
Number of Delivery paths	Only 1	Only 1	1 Active, 1 Passive	2 Active
Redundant Components	N	N + 1	N + 1	2 (N + 1) S + S
Support Space to Raised Floor Ratio	20%	30%	80-90%	100%
Initial Watts/ft	20-30	40-50	40-60	50-80
Ultimate Watts/ft	20-30	40-50	100-150	150 +
Raised Floor Height	12"	18"	30-36"	30-36"
Floor Loading Pounds/ft	85	100	150	150 +
Utility Voltage	208, 480	208, 480	12-15kV	12-15kV
Months to Implement	3	3 to 6	15 to 20	15 to 20
Year First Deployed	1965	1970	1985	1995
Construction \$/ft Raised Floor	\$450	\$600	\$900	\$1,100 +
Annual IT Downtime Due to Site	28.8 hrs	22.0 hrs	1.6 hrs	0.4 hrs
Site Availability	99.671%	99.749%	99.982%	99.995%

Providing redundant cross-connect areas and pathways that are physically separated can increase the reliability of the communications infrastructure. It is common for data centers to have multiple access providers providing services, redundant routers, redundant core distribution and edge switches. Although this network topology provides a certain level of redundancy, the duplication in services and hardware alone does not ensure that single points of failure have been eliminated.



Purpose of the ISO 11801:2002 Standard

The International Standard provides:

- Users with an application independent generic cabling system capable of supporting a wide range of applications
- Users with a flexible cabling scheme so that modifications are both easy and economical
- Building professionals (for example architects) guidance on the accommodation of cabling at the initial stages of development

The International Standard specifies a multivendor cabling system which may be implemented with material from single and multiple sources, and is related to:

- International standards for cabling components developed by committees in the IEC.
- Standards for the installation and operation of information technology cabling as well as for testing of installed cabling
- Applications developed by technical committees of the IEC
- Planning and installation guides which take into account the needs of specific applications

Generic cabling defined within this International Standard:

- Specifies a cabling structure supporting a wide variety of applications
- Specifies channel and link classes A,B,C,D and E meeting the requirements of standardized applications
- Specifies channel and link classes E and F based on higher performance components to support future applications
- Specifies optical channel and link classes OF-300, OF-500 and OF-2000
- Involves component requirements and specifies cabling implementations that ensure performance of permanent links and channels that meet or exceed the requirements for cabling classes

The International Standard specifies a generic cabling system that is anticipated to have a usable life in excess of 10 years.