

ANSI/NECA/BICSI 568-2001
Standard for
**Installing Commercial Building
Telecommunications Cabling**

Published by
BICSI®
A Telecommunications Association



Jointly developed with
National Electrical
Contractors Association

An American National Standard



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FOREWORD

In 1998, a large number of companies representing the telecommunications and electrical industry expressed concern over the lack of a standard for installation of telecommunications premises cabling systems. The National Electrical Contractors Association™ (NECA™) asked BICSI®, A Telecommunications Association, to jointly undertake the task of developing the required standard. BICSI® accepted the task and the project was assigned to BICSI/NECA Joint Technical Committee 1 for the Development of Telecommunications Cabling Installation Guidelines.

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The viewpoint expressed at the time this standard was approved was from the contributors' experience and the state of the art at that time. Users are encouraged to check to see that they have the latest revision of the standard.

BICSI/NECA/JTC1 reviews its standards, at the minimum, every 5 years. At that time standards are reaffirmed, rescinded or revised according to the submitted updates. Updates to be included in the next revision should be sent to the committee chair or to BICSI/NECA/JTC1.

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1. Scope

A structured cabling system is a complete collective configuration of cabling and associated hardware on a premises which, when installed, provides a comprehensive telecommunications infrastructure. This infrastructure is intended to support a wide range of telecommunications services such as telephone and computer networks. Figure 1 illustrates an example of components that comprise a structured cabling system.

This Standard describes procedures for installing cabling that carries telecommunications signals (e.g., voice, local area network). It specifies minimum requirements for telecommunications cabling installations. This standard is intended to be used in describing a “neat and workmanlike manner” as required by the *National Electrical Code (NEC)*, Sections 110-12 and 800-6.

Installers should always follow the *NEC*, applicable state and local codes, and manufacturers’ instructions when installing electrical and telecommunications products and systems. Information within this standard is intended to comply with the following:

- ANSI/NFPA 70, 2002; *National Electrical Code*®
- ANSI/TIA/EIA 568-B Series-2001, *Commercial Building Telecommunications Cabling Standard*
- ANSI/TIA/EIA 569-A-1998, *Commercial Building Standard for Telecommunications Pathways and Spaces*
- ANSI/TIA/EIA 606-1993, *Administration Standard for the Telecommunications Infrastructure of Commercial Buildings*
- ANSI/TIA/EIA 607-1994, *Commercial Building Grounding and Bonding Requirements for Telecommunications*
- ANSI/NFPA 101, 2000, *Life Safety Code*
- ANSI/NESC, 1997, *National Electrical Safety Code*

This Standard describes the installation of twisted pair copper cabling and optical fiber cabling that meets ANSI/TIA/EIA-568-B performance.

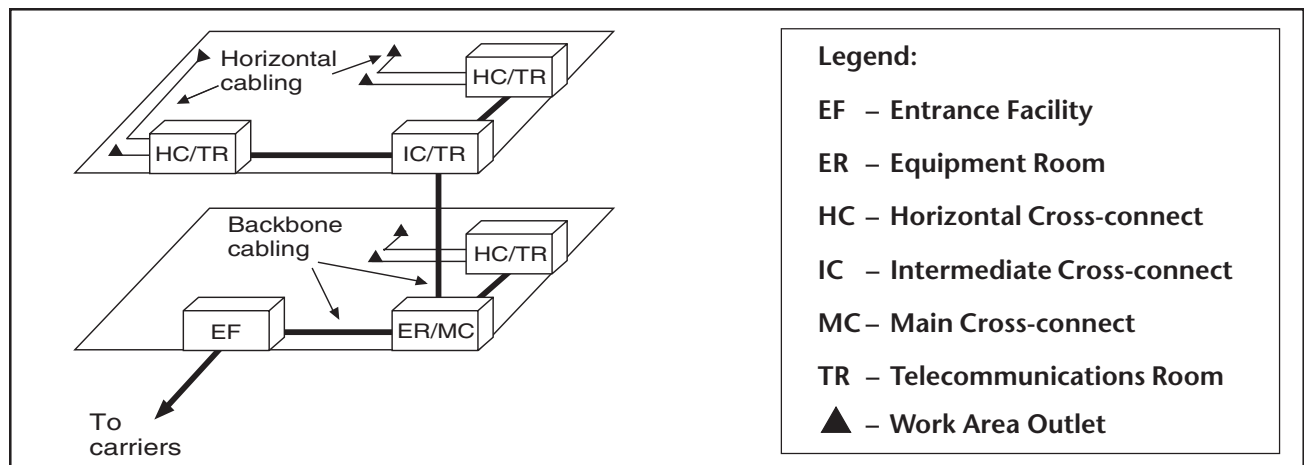


Figure 1. Example of structured cabling system

2. Definitions, Acronyms, Abbreviations, and Units of Measure

2.1 Definitions

For the purposes of this Standard, the following definitions apply.

administration: The method for labeling, documentation, and usage needed to implement moves, additions, and changes of the telecommunications infrastructure.

all-threaded-rod: A straight section of round rod stock that has threads installed over its entire length. Also known as a threaded rod.

American wire gauge: A system used to specify wire size. The greater the wire diameter, the smaller the value (e.g., 24 AWG [0.51 mm (0.020 in)]).

anchor: 1. In a premises environment, a device inserted into a prepared hole in which a screw or bolt has been inserted. 2. In an outside plant environment, a device made up of a single plate or series of flat plates, and combined with a rod having a connecting eye. When the plates are direct-buried and the rod is exposed, the device becomes a secure point to connect to for stability.

architectural assemblies: Walls, partitions, or other barriers that are not load bearing.

architectural structures: Walls, floors, floor/ceilings, and roof/ceilings that are load bearing.

as-built: Documentation that indicates cable routing, connections, systems, and blueprint attributes upon job completion that reflects changes from the planned to the finished state.

attenuation: The decrease in magnitude of transmission signal strength between points, expressed as the ratio of output to input. Measured in decibels (dB), usually at a specific frequency for copper or wavelength for optical fiber, the signal strength may be power or voltage.

authority having jurisdiction: The building official, electrical inspector, fire marshal, or other individuals or entities responsible for interpretation and enforcement of local building and electrical codes.

backboard: A panel (e.g., wood or metal) used for mounting connecting hardware and equipment.

backbone: A facility (e.g., pathway, cable, or conductors) between telecommunications rooms, or floor distribution terminals, the entrance facilities, and the equipment rooms within or between buildings.

backbone cable: *See backbone and backbone cabling.*

backbone cabling: Cable and connecting hardware that provides interconnections between telecommunications rooms, equipment rooms, and entrance facilities. *See backbone.*

backbone pathway: The portion of the pathway system that permits the placing of backbone cables between the entrance location and all cross-connect points within a building and between buildings.

bandwidth: A range of frequencies, usually the difference between the upper and lower limits of the range, expressed in Hz. It is used to denote the potential capacity of the medium, device, or system. In copper and optical fiber cabling, the bandwidth decreases with increasing length.

barrier: A partition installed in a raceway or cable tray that provides complete separation of the adjacent compartment.

beam clamp: Device attached to a beam or other building structure above the ceiling to hold cable supports or equipment.

bend radius: Maximum radius that a cable can be bent to avoid physical or electrical damage or cause adverse transmission performance.

binder group: A group of wire pairs found in a large cable. Groups can be distinguished from one another through the use of colored threads. Standard color-coding provides for 25 pairs per binder group.

blueprint: A reproduction of an architectural plan and/or technical drawing that provides details of a construction project or an existing structure. These drawings are printed on special paper that allows graphics and text to appear as blue on a white background.

bonding: The permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity, the capacity to safely conduct any current likely to be imposed, and the ability to limit differences in potentials between the joined parts.

bonding conductor: A conductor used specifically for the purpose of bonding.

braid: Cable shield that consists of interwoven metallic strands to surround insulated conductors.

bridle ring: A ring that is circular in shape but is open rather than closed. It has a pointed shaft at its apex that is threaded for installation into wood or pre-threaded devices.

bullwheel: Large wheel used to maintain bend radius when feeding large diameter cables into a pathway.

bundle: 1. Many individual optical fibers contained within a single jacket or buffer tube. Also, a group of buffered optical fibers distinguished in some fashion from another group in the same cable core. 2. Also used to indicate time and common handling of multiple cables routed together.

cabinet: An enclosed container with four rails used for mounting a wide variety of miscellaneous equipment inside them (e.g., fans, power strips, connection devices, terminations, apparatus, wiring, equipment, etc.). They are available in a wide variety of sizes for either wall-mounting or self-supporting.

cable: An assembly of one or more insulated conductors or optical fibers within an enveloping sheath, constructed to permit use of the conductors or optical fibers singly or in groups. See aerial cable; direct-buried cable; hard-sheath cable; underground cable.

cable rack: The vertical or horizontal open support structure (usually made of aluminum or steel) that is attached to a ceiling or wall.

cable run: A length of installed media in between connection points, which may include permanent splices.

cable sheath: A covering over the optical fiber or conductor assembly that may include one or more metallic members, strength members, or jackets.

cable support system: A combination of conduits, cable trays, support hooks, tie wraps, and any other hardware pieces used in a cabling installation to support cables. Cable support systems keep excess stress off the cables and may provide some mechanical protection to the cables being supported.

cable termination: 1. Item used for attaching the pairs of a cable to allow for connecting the cable to other cables or devices. Examples of cable termination hardware are: patch panels, connecting blocks, patch blocks 66M-, 110- or BIX-type, and modular jacks. 2. The connection of the wire or optical fiber to a device, such as equipment, panels, or a wall outlet.

cable tray: A support mechanism used to route and support telecommunications cable or power cable. Typically equipped with sides that allow cables to be placed within the sides over its entire length.

cable tree: Vertical rack with multiple arms for holding small reels of cable.

cabling: A combination of all copper and optical fiber telecommunications cables, equipment/patch cords, and connecting hardware.

cabling system: A specific system of telecommunications cables, equipment/patch cords, connecting hardware, and other components that is supplied as a single entity.

channel: 1. The end-to-end transmission between two points to which application-specific equipment is connected including the patch cords at the device location and at the telecommunications room. 2. ANSI/TIA/EIA-568-B.1 defines a channel as up to 90 m (295 ft) of horizontal cable with connectors (work area and telecommunications room), plus up to 10 m (33 ft) of patch cords and equipment cords.

channel stock: A metallic u-shaped bar with spaced holes often hung in a trapeze configuration for support of pathway systems, such as conduits and trays.

circuit: The electrical or optical path used for communications between two devices.

code: A systematic collection of regulations and rules intended to ensure safety during installation and use of materials, components, fixtures, systems, premises, and related subjects. Codes are typically invoked and enforced through government regulation.

commercial building: A building, or portion thereof, that is intended for office use.

composite: Made up of disparate or separate parts (e.g., copper and optical fiber cables).

conduit: A rigid or flexible metallic or non-metallic raceway of circular cross-section through which cables can be pulled.

conduit elbow: A bend in a section of conduit, usually at a specified radius and degree of turn.

conduit stub-out: A short section of conduit that is installed from a receptacle box, usually in a wall, through a suspended ceiling space a short distance to an adjacent hallway.

conduit stub-up: A short section of conduit that is installed from a receptacle box, usually in a wall, to a suspended ceiling space immediately above the receptacle box.

cone: Safety marker that is used to designate a secure off-limits area for non-workers.

connecting hardware: A device, or combination of devices, used to connect two cables or cable elements.

connector: A mechanical device used to provide a means for aligning, attaching, and achieving continuity between conductors or optical fibers.

consolidation point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.

contractor: A person or company contracted to perform a specific task.

cord (telecommunications): A cable using stranded conductors for flexibility, as in distribution cords or line cords.

core: The central, light-carrying part of an optical fiber through which light pulses are transmitted.

crimp: The act of clamping connectors to a cable.

cross-connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

cross-connection: A connection scheme between cabling runs, subsystems, and equipment using patch cords or jumpers that attach to connecting hardware on each end.

crossed pairs: Error condition in twisted-pair wiring where pairs are reversed.

crosstalk: The unwanted reception of electromagnetic signals on a communications circuit from another circuit.

current: Flow of electrons in a conductor measured in amperes.

data: Electronically encoded information.

decibel: A logarithmic unit used for expressing the loss or gain of signal strength. One dB is the amount by which the pressure of a pure sine wave of sound must be varied in order for the change to be detected by the average human ear.

dressings: Placing cables into a neat and symmetrical pattern for proper alignment and positioning for termination.

D-ring: Wire management ring made of metal or plastic, and shaped like the letter D for routing and supporting distribution cables and/or cross-connections on a backboard.

drywall: An interior wall construction consisting of gypsum or plasterboard.

duct: 1. A single enclosed pathway for conductors or cables, usually placed in soil or concrete. 2. An enclosure in which air is moved. Generally part of the heating, ventilation, and air conditioning system of a building.

elastomeric firestop: A flexible firestopping material resembling rubber.

entrance facility (telecommunications): An entrance to a building for both public and private network service cables (including antennae) including the entrance point at the building wall and continuing to the entrance room or space.

entrance point (telecommunications): The point of emergence for telecommunications cabling through an exterior wall, a floor, or from a conduit.

entrance room or space (telecommunications): A space in which the joining of inter or intrabuilding telecommunications backbone facilities takes place.

equal level far-end crosstalk: A measure of the unwanted signal coupling from a transmitter at the near-end into a neighboring pair measured at the far-end, and normalized to the received signal level.

equipment room (telecommunications): A centralized space for telecommunications equipment that serves the occupants of a building. Equipment housed therein is considered distinct from a telecommunications room because of its nature or complexity.

exposed: When a circuit is in such a position that in case of failure of supports or insulation, contact with another conductor may result.

far-end crosstalk: Crosstalk measured and expressed in dB at the opposite end from which the source signal is transmitted. The unwanted reception or coupling of signals by one wire pair from another wire pair at the opposite end of a link. Contrast with near-end crosstalk.

fastener: A screw, bolt, or nail-like device that is used to secure an item to a wall, floor, or ceiling with an anchor.

fiber: Thin filament of glass or plastic that conducts a light signal. See optical fiber and plastic optical fiber.

fire retardant: Any substance added to delay the start of ignition or fire or slow the spread of the flame of any material.

firestop: A material, device, or assembly of parts in an architectural barrier to prevent vertical or horizontal passage of flame, smoke, water, or gases through the rated barrier.

firestopping: The process of installing specialty materials into penetrations of fire-rated barriers to re-establish the integrity of the barrier. *See cementitious firestop and elastomeric firestop.*

firestop system: A specific listed assembly consisting of the material(s) (firestop penetration seals) that fill the opening in the wall or floor assembly, and around and between any items that penetrate the wall or floor (e.g., cables, cable trays, conduit, ducts, pipes), and any termination devices (e.g., electrical outlet boxes), along with their means of support.

firewall: 1. A wall that helps prevent fire spreading from one fire zone or area to another, and that runs from structural floor to structural ceiling. 2. One or more security mechanisms designed for access control and authentication to prevent, detect, suppress, and/or contain unauthorized access to a network. Firewalls are designed to keep unwanted and unauthorized traffic from a protected network.

fire zone: A contained area completely enclosed by fire-resistant rated walls, floors, and ceilings.

floor slab: 1. The upper part of a reinforced concrete floor that sits on beams. 2. A concrete mat poured on subgrade serving as a floor rather than as a structural member.

foiled twisted-pair cable: *See screened twisted-pair cable.*

foldback splicing: Process of folding back conductors in a splice for future maintenance or rearrangements.

frequency: 1. The measure of the number of cycles (waves) per second, expressed in Hertz (Hz). 2. The number of identical cycles per second of a periodic wave.

fusion splice: A permanent joint accomplished by applying localized heat sufficient to fuse or melt the ends of two optical fibers together, forming a continuous single fiber.

ground: A conducting connection, whether intentional or accidental, between an electrical circuit (e.g., telecommunications) or equipment and the earth, or to some conducting body that serves in place of earth.

ground electrode: A conductor, usually a rod, pipe, or plate (or group of such conductors), in direct contact with the earth providing a connection point to the earth.

grounded: Connected to earth or to some conducting body that serves in place of the earth.

ground wire: *See grounding conductor.*

grounding conductor: A conductor used to connect electrical equipment to the grounding electrode to the building's main grounding busbar.

grounding system: A system of hardware and wiring that provides an electrical path from a specified location to an earth ground point.

hanger: A device that is used to hold something in position.

hertz: A unit of frequency equal to one cycle per second.

horizontal cable: Cable that runs from the telecommunications room to a device location. It may be installed in either a horizontal or vertical plane.

horizontal cabling: The cabling between and including the work area telecommunications outlet/connector and the horizontal cross-connect (floor distributor) in the telecommunications room.

horizontal cross-connect: A group of connectors, such as patch panel or punch-down block, that allows equipment and backbone cabling to be cross-connected with patch cords or jumpers. Floor distributor is the international term for horizontal cross-connect.

infrastructure (telecommunications): 1. A collection of those telecommunications components, excluding equipment, that together provide the basic support for the distribution of all information within a building or campus. 2. Substructure of system used to support the cable plant being installed.

in-line splice: A splice in which cable enters one endcap and, after splicing the cable, exits the other endcap of the closure.

innerduct: A non-metallic pathway placed within a larger pathway.

insulation: The dielectric material that physically separates wires and prevents conduction between them.

insulation displacement connector: A type of wire terminating connection in which the insulation jacket is cut by the connector where the wire is inserted.

interconnect: A location where interconnections are made.

interconnection: A connection scheme that provides for the connection of a cable to another cable or to an equipment cable.

intermediate cross-connect: The connection point between a backbone cable that extends from the main cross-connect (campus distributor) (first-level backbone) and the backbone cable from the horizontal cross-connect (floor distributor) (second-level backbone). Building distributor is the international term for intermediate cross-connect.

jacket: The outer layer of a cable. *See cable sheath.*

J-hook: A supporting device for horizontal cables that is shaped like a "J". It is attached to some building structures. Horizontal cables are laid in the opening formed by the "J" to provide support for the cables.

jumper: 1. An assembly of twisted pairs without connectors, used to join telecommunications circuits/links at the cross-connect. 2. An optical fiber cable with connectors installed on both ends. *See cable assembly.*

ladder rack: A device similar to a cable tray but more closely resembles a single section of a ladder. It is constructed of metal with two sides affixed to horizontal cross members.

link: A transmission path between two points, not including terminal equipment, work area cables, patch cables, and equipment cables. Can be up to 90 m (295 ft) in length for horizontal cabling.

local area network: A geographically limited data communications system for a specific user group consisting of a group of interconnected computers sharing applications, data, and peripheral devices such as printers and CD-ROM drives intended for the local transport of data, video, and voice.

loss: Attenuation of the optical signal, usually measured in dB.

main cross-connect: The cross-connect normally located in the (main) equipment room for cross-connection and interconnection of entrance cables, first-level backbone cables, and equipment cables. Campus distributor is the international term for main cross-connect.

megahertz: A unit of frequency equal to one million cycles per second (hertz).

membrane penetration: An opening through only one surface or side of a barrier.

modular furniture: Groups of low-wall partitions, desks, and furniture assembled in the field in open spaces within an office.

modular patch panel: A facility enabling the terminating of cable elements on insulation displacement connector modules and their connections by means of a patch cord.

multimode: Transmits or emits more than one propagating mode.

multimode optical fiber: A graded-index or step-index optical fiber that supports the propagation of more than one bound mode.

mushroom: A plastic guide in the shape of a mushroom, used for routing jumpers.

National Electrical Code® (NEC®): A safety code written and administered by the National Fire Protection Association.

National Fire Protection Association (NFPA®): Association that writes and administers the *National Electrical Code®*.

near-end crosstalk: The unwanted signal coupling between pairs. It is measured at the end of a cable nearest the point of transmission. Contrast with far-end crosstalk.

network: A group of three or more nodes that can communicate with each other, either directly through common wiring or indirectly through repeaters to separated wiring. *See data network.*

ohm: The standard unit of electrical resistance that measures the opposition to the flow of direct current, called resistance, or opposition to the flow of alternating current, called impedance. One volt will cause one ampere of current to flow through one ohm of resistance. The symbol is Ω .

optical fiber: Transmission medium using glass or plastic to transmit pulse light signals. Its bandwidth is higher than copper and not subject to electromagnetic interference. The optical fiber consists of a central core (glass or plastic) and an outer cladding. *See fiber and plastic optical fiber.*

optical fiber cable: Cable made up of one or more strands of optical fiber, strength members, and an outer jacket.

outlet box (telecommunications): A metallic or non-metallic box mounted within a wall, floor, or ceiling and used to hold telecommunications outlets/connectors or transition devices.

outlet/connector (telecommunications): Mechanical cable termination device for horizontal cable in the work area.

pair: 1. Two insulated wires twisted around each other. 2. One side circuit (two diametrically facing conductors) in a star quad.

pair count: Indicates how many pair of wires are in a cable or the pair identification serving a location.

patch cord: A length of cable with connectors on one or both ends used to join telecommunications circuits/links at the cross-connect.

patch panel: *See modular patch panel.*

pathway: 1. A sequence of connections that provides the connectivity between devices on a network or between networks on an internetwork. 2. The vertical and horizontal route of the telecommunications cable.

plenum: A designated area used for transport of environmental air as part of the air distribution system. Because it is part of the air distribution system, cables installed in this space require a higher fire rating.

plenum rated: Meeting flammability and smoke requirements for the purpose of fire, life, and safety as described by the *National Electrical Code® (NEC®)*.

power sum equal level far-end crosstalk loss: A computation of the unwanted signal coupling from multiple transmitters at the near end into a pair measured at the far end, and normalized to the received signal level.

power sum near-end crosstalk: Power sum assumes all pairs in a cable contribute in crosstalk, using a formula that totals crosstalk power.

power sum near-end crosstalk loss: A computation of the unwanted signal coupling from multiple transmitters at the near end into a pair measured at the near end.

premises: A generic term that includes a building or set of buildings on common property that are occupied by a single tenant or landlord.

pull: 1. The act of placing cable by pulling. 2. The longitudinal force acting on a pole as a result of horizontal loading.

pull cord: Cord placed within a cable pathway, used to pull wire and cable. *See drag line.*

pull strength: The rated strength of the force of a cable that can be exerted on it during the pulling process.

pull tension: The pulling force that can be applied to a cable without affecting specified characteristics for the cable.

raceway: Any enclosed channel designed for holding wires, cables, or busbars.

rack: *See cable rack.*

reel brake: A device used to control the rate of removal of a cable from a cable reel.

resistance: A measure of opposition a material offers to the flow of direct current.

return loss: 1. A ratio, expressed in dB, of the power of the outgoing signal to the power of the reflected signal. 2. The amount of reflected power compared to the amount of incident power at an interface, expressed in dB. Return loss is a critical factor in singlemode links because reflected light can destabilize some lasers.

reversed pair: When the polarity of the wires is reversed. A wiring error in twisted-pair cabling where the pins on a cable pair are reversed between connectors on one end of the cable.

ring: A means for identification of one conductor of a pair. Historically associated with the wire connected to the "ring" portion of an operator's telephone plug.

screened twisted-pair cable: A cable with one or more pairs of twisted copper conductors covered with an overall metallic shield. *See foiled twisted-pair cable.*

sheath: *See cable sheath.*

shield: Metallic layer placed around a conductor or group of conductors to prevent electrostatic or electromagnetic coupling between the enclosed wires and external fields.

shield: A continuous metallic layer placed around a conductor or group of conductors.

shielded twisted-pair cable: Cable made up of multiple twisted copper pairs, each pair with an individual shield. The entire structure is then covered with an overall shield or braid and an insulating sheath (cable jacket).

short: A low-resistance connection between two conducting materials.

singlemode optical fiber: An optical fiber, usually step-index grade, that supports only one mode of light propagation. This does not necessarily imply single-wavelength operation. The light source is normally a laser.

sleeve: A short section of conduit, either metallic or non-metallic, lining an opening in the wall or floor for cables to pass through.

space (telecommunications): An area used for housing the installation and termination of telecommunications equipment and cable (e.g., equipment rooms, telecommunications rooms, work areas, and maintenance holes/handholes).

splice: A joining of conductors in a splice closure, meant to be permanent.

splice case: A metal or plastic housing with a semicylindrical cavity used in identical pairs to clamp around a cable splice to provide a closure.

splice closure: *See splice case.*

split pair: Inadvertent transposition of two conductors of separate pairs.

standard: A collection of requirements that encompass properties of components and systems that are intended to ensure an accepted degree of functionality and longevity. Standards are intended to reflect accepted norms as typically determined through a balloting process conducted by a nationally or internationally accredited organization.

STP-A: An IBM designed, shielded twisted-pair cable consisting of two individually shielded 22 AWG [0.64 mm (0.025 in)] conductor pairs, with an overall shield capable of supporting transmission to 300 MHz.

stub-out: Conduit installed from a wall outlet to a raceway.

stub-up: Conduit installed from a wall or floor outlet into the accessible ceiling space above.

surface-mounted raceway: Plastic or metallic raceway that is installed on the surface of a wall, floor, or ceiling. Provides a protective pathway for cables and/or power from public access.

suspended ceiling: A ceiling that creates an area or space between the ceiling material and the building structure above the material. This area may or may not be an air handling space requiring plenum rules of a national code. The design of the air conditioning/heating system determines this.

telecommunications: A branch of technology concerned with the transmission, emission, and reception of signs, signals, writing, images, and sounds; that is, information of any nature by cable, radio, optical, or other electromagnetic systems.

telecommunications entrance facility: *See entrance facility (telecommunications).*

telecommunications entrance point: *See entrance point (telecommunications).*

telecommunications entrance room or space: *See entrance room or space (telecommunications).*

telecommunications equipment room: *See equipment room (telecommunications).*

telecommunications grounding busbar: A common point of connection for telecommunications system and equipment bonding to ground; located in the telecommunications room or equipment room.

telecommunications main grounding busbar:

A busbar placed in a convenient and accessible location and bonded, by means of the bonding conductor for telecommunications, to the building service equipment (power) ground.

telecommunications outlet: *See outlet/connector (telecommunications).*

telecommunications room: An enclosed space for housing telecommunications equipment, cable terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and horizontal cabling.

telecommunications service entrance:

See entrance facility (telecommunications).

tie wrap: Plastic or hook and loop strip used for binding and dressing cable.

trapeze: A support device using threaded rod and channel stock.

tray: *See cable tray.*

twisted-pair: Two individually insulated conductors physically twisted together to form a balanced pair.

twisted-pair cable: A multiconductor cable comprising two or more copper conductors twisted in a manner designed to cancel electrical interference.

underfloor raceway: A pathway placed within the floor and from which wires and cables emerge to a specific floor area.

unshielded twisted-pair cable: Cable containing one or more pairs of twisted copper without metallic shielding.

volt (V): A unit of electromotive force or potential difference that will cause a current of one ampere to flow through a resistance of one ohm.

wavelength: The length of a wave measured from any point on one wave to the corresponding point on the next wave, such as from crest to crest. The wavelength of light is usually measured in nanometers.

wire: An individually insulated solid or stranded metallic conductor.

wireway: A supported pathway for cables.

work area: A building space where the occupants interact with telecommunications terminal equipment.

work area outlet: A device placed at user workstation for termination of horizontal media and for connectivity of network equipment.

workstation: A telecommunications device used in communicating with another telecommunications device.

2.2 Acronyms, abbreviations, and units of measure

AHJ	Authority Having Jurisdiction
ATR	all-threaded-rod
AWG	American wire gauge
°C	degree Celsius
CP	consolidation point
CT	cable tray
dB	decibel
EF	entrance facility
ELFEXT	equal level far-end crosstalk
EMT	electrical metallic tubing
EP	entrance point
ER	equipment room
°F	degree Fahrenheit
FEXT	far-end crosstalk
ft	feet, foot
HC	horizontal cross-connect
HVAC	heating, ventilation, and air conditioning
Hz	hertz
IC	intermediate cross-connect
IDC	insulation displacement connector
IMC	intermediate metal conduit
in	inch
km	kilometer
kVA	kilovolt amp
LAN	local area network
lb	pound
lbf	pound-force
LED	light-emitting diode
m	meter
μm	micron; one millionth of a meter (0.000001 meter); also micrometer
MC	main cross-connect
MDF	main distribution frame

MHz	megahertz
mm	millimeter
MM	multimode
MUTOA	multi-user telecommunications outlet assembly
NEC®	<i>National Electrical Code®</i>
NECA®	<i>National Electrical Contractors Association®</i>
NEXT	near-end crosstalk
NFPA®	National Fire Protection Association®
PSELFEXT	power sum equal level far-end crosstalk
PSNEXT	power sum near-end crosstalk
RMC	rigid metal conduit
SC	subscriber connector
ScTP	screened twisted-pair
SM	singlemode
STP-A	shielded twisted-pair-A
TBB	telecommunications bonding backbone
TGB	telecommunications grounding busbar
TMGB	telecommunications main grounding busbar
TO	telecommunications outlet
TR	telecommunications room
USOC	Universal Service Ordering Code
UTP	unshielded twisted-pair
V	volt
X	cross-connect