Purpose of the ANSI/TIA/EIA-569-A Standard

As the complexity of voice and data telecommunications has increased, standards have been established to ensure the operability, flexibility, manageability and longevity of these critical commercial support systems. Telecommunications now encompasses voice, data and video transmission of business information, fire and security, audio, environmental and other intelligent building controls over media that includes fiber optics, specialized copper data cabling, microwave and radiowave. This booklet concisely describes the architectural design elements of cabling pathways and dedicated rooms for telecommunications equipment.

A multi-tenant commercial building has a life expectancy of at least 50 years. Software, hardware and communications gear have far shorter lifespans of one to five years. Moreover, in a multi-tenant environment, continuous moves, adds and changes are inevitable. It is the purpose of standards to guide design and ease future changes by planning for the future now. These standards are intended to provide for a generic structured cabling plant, capable of running any voice or data application foreseeable in the next 10 to 15 years.

Abbreviations:

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>AWG</td>
<td>American Wire Gauge</td>
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<tr>
<td>V</td>
<td>volts</td>
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<td>A</td>
<td>amps</td>
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<tr>
<td>kVA</td>
<td>kilovolt ampere</td>
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<tr>
<td>V/m</td>
<td>volts per meter</td>
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Pathways and Spaces

1. Electric Entrance  
2. Telco Entrance  
3. Telecom Equipment Room  
4. Data  
5. Voice  
6. Telecom Room  
7. Grounding and Bonding  
8. Underfloor System
TIA/EIA-569-A Design Considerations

Service Entrance Pathways

For underground facilities, use a minimum 4-inch conduit or duct constructed of PVC type B, C or D, multiple plastic duct, galvanized steel, fiber glass. With appropriate encasement. No more than two 90° manufactured bends are allowed (10 times the diameter). Drain slope should not be less than 12 inches per 100 ft. Recommended conduit fill varies but should not exceed 40% for more than two cables.

Maintenance holes (typically 3,500 lb./sq. in., concrete) must be equipped with sump, corrosion-protected pulling iron, cable racks, grounded ladder and only such power and light conductors as required for telecommunications support per NEC requirements.

Entrance Facilities

Entrance facilities include the pathways for outside carrier services, interbuilding backbone, alternate entrance and antennae entrance pathways. The entrance facilities consist of a termination field interfacing any outside cabling to the intrabuilding backbone cabling. The local telephone carrier is typically required to terminate cabling within 50 ft of building penetration and to provide primary voltage protection.

In buildings larger than 20,000 usable sq. ft., a locked, dedicated, enclosed room is recommended. Beyond 70,000 sq. ft., a locked, dedicated room is required, with a plywood termination field provided on two walls.

In buildings up to 100,000 usable sq. ft., a wall-mounted termination field may serve as the entrance facility, using 3/4-inch plywood, 8 ft high. Beyond 100,000 sq. ft., rack-mounted and free-standing frames may also be required.

Minimum space requirements are given as follows:
Rule of thumb: Allow 1 sq. ft. of plywood wallmount for each 200 sq. ft. area of floor space.

Equipment Room

An equipment room is essentially a large telecommunications room that may house the main distribution frame, PBXs, secondary voltage protection, etc. The equipment room is often appended to the entrance facilities or a computer room to allow shared air conditioning, security, fire control, lighting and limited access.

Rule of thumb: Provide 0.75 sq. ft. of equipment room floor space for every 100 sq. ft. of user workstation area.
Location
Typically, rooms should be located away from sources of electromagnetic interference (transformers, motors, x-ray, induction heaters, arc welders, radio and radar) unless interference is less than 3 V/m across the frequency spectrum. Avoid sources of flooding.

Perimeters
Typically, no false ceiling; all surfaces treated to reduce dust; walls and ceiling painted white or pastel to improve visibility.

Limited Access
Typically, single or double 36” x 80” lockable doors.

Other
Typically, no piping, ductwork, mechanical equipment or power cabling should be allowed to pass through the equipment room. No unrelated storage.

HVAC
24 hours a day, 365 days a year, 64° to 75°F, 30 to 55% humidity, positive pressure.

Lighting
Typically, 8.5 ft high, providing 50 ft candles @ 3 ft. above floor.

Electrical
Typically, a minimum of two dedicated 15 A, 110 V AC duplex outlets on separate circuits is required. Convenience duplex outlets shall be placed at 6 ft intervals around the perimeter. Emergency power should be considered and supplied if available.

Dust
Less than 100 micrograms/cubic meter/24 hour period.

Note: The term “typically” is applied here to indicate, where applicable, that these requirements also apply to other elements of the cabling system spaces. Lighting requirements, for instance, are largely identical for entrance facilities, equipment rooms and telecom rooms.
Intrabuilding Backbone Pathways

Within a building, the intrabuilding backbone pathways extend between the entrance facilities, equipment room and telecommunications rooms. Telecom rooms should be stacked vertically above each other on each floor, and provided with a minimum of three 4-inch sleeves (a stub of conduit through the floor) for less than 50,000 sq. ft. served. An equivalent 4” x 12” slot may be used in lieu of three sleeves. Firestopping is required. If rooms are not vertically aligned, then 4-inch horizontal conduit runs are required. Include no more than two 90° bends between pull points. Pulling iron or eyes embedded in the concrete for cable pulling is recommended. Fill should not exceed 40% for any run greater than two cables.

Backbone and Horizontal Pathways

1. Telco Conduit
2. Telco Manhole
3. Entrance Conduit
4. Telco Entrance Facility
5. Telcom Equipment Room
6. Vertical Backbone
7. Telecom Room
8. Horizontal Cabling
9. Interbuilding Backbone
10. Electrical Entrance Facility
Telecommunications Room

The telecommunications room on each floor is the junction between backbone and horizontal pathways. It contains active voice and data telecommunications equipment, termination fields and cross-connect wiring. More than one telecom room per floor is required if distance to a work area exceeds 300 feet, or if floor area served exceeds 10,000 square feet. Recommended room sizing is 10' x 11' for each 10,000 square-foot area served. Power, lighting, air conditioning and limited access are typical. See requirements for equipment room. There are a minimum of three 4-inch firestopped backbone sleeves in the floor at the left side of a plywood termination field, which are ideally located near the door. A fire extinguisher is recommended.

Riser Sleeve

Typical Telecommunications Room
Horizontal Pathways

Horizontal pathways extend between the telecommunications room and the work area. A variety of generic pathway options are described. Choice of pathway(s) is left to the discretion of the designer. The most commonly employed pathway consists of cable bundles run from the telecom room along J-hooks suspended above a plenum ceiling, which fan out once a work zone is reached. They then drop through interior walls or support columns or raceways, and terminate at an information outlet (I/O).

Other options include the following:

**Underfloor Duct**
Single- or dual-level rectangular ducts imbedded in greater than 2.5-inch concrete flooring.

**Flushduct**
Single-level rectangular duct imbedded flush in greater than 1-inch concrete flooring.

**Multi-channel Raceway**
Cellular raceway ducts capable of routing telecom and power cabling separately in greater than 3-inch reinforced concrete.

**Cellular Floor**
Pre-formed hollows or steel-lined cells are provided in concrete with header ducts from the telecom room arranged at right angles to the cells.

**Trenchduct**
A wide, solid tray, sometimes containing compartments, and fitted with a flat top (with gaskets) along its entire length. It is embedded flush with the concrete finish.

**Access Floor**
Modular floor panels supported by pedestals, used in computer rooms and equipment rooms.

**Plenum/Ceiling**
Bundled cables, suspended above a false ceiling, fan out to drop through walls, power poles or along support columns to baseboard level.
Conduit
To be considered only when outlet locations are permanent, device density low and flexibility (future changes) are not required.

Cable Trays
Options include channel tray, ladder tray, solid bottom, ventilated and wireway.

Perimeter Pathways
Options include surface raceway, recessed, molding and multichannel (to carry separate power and lighting circuits).

Rule of thumb: Typically, size horizontal pathways by providing 1 sq. in. of cross-section area for every 100 sq. ft. of workspace area being served.

Perimeter Pathway and Modular Office Path

Note: Typically, a pull box, splice box or pulling point is required for any constrained pathway where there are more than two 90° bends, a 180° reverse bend or length more than 100 ft.
A Variety of Horizontal Pathways

Access Floor

Ceiling Utility Pole
Consolidation Points and MUTOAs
Consolidation points provide limited area connection access. Typically, a permanent flush wall, ceiling or support column-mounted panel serves modular furniture work areas. The panels must be unobstructed and fully accessible without moving fixtures, equipment or heavy furniture.
A multi-user telecommunication outlet assembly (MUTOA) is another methodology to reduce cabling moves, adds and changes in modular furniture settings. The user cord is directly connected to the MUTOA. A MUTOA location must be accessible and permanent, and may not be mounted in ceiling spaces or under access flooring. Similarly, it cannot be mounted in furniture unless that furniture is permanently secured to the building structure.
For more descriptive information on distance limitations and purposes of consolidation points and MUTOAs, see ANSI/TIA/EIA-568-B.1.

Electromagnetic Interference
Voice and data telecommunications cabling should not be run adjacent and parallel to power cabling — even along short distances — unless one or both cable types are shielded and grounded. For low voltage communication cables, a minimum 5-inch distance is required from any fluorescent lighting fixture or power line over 2 kVA and up to 24 inches from any power line over 5 kVA*. In general, telecommunications cabling is routed separately, or several feet away from power cabling. Similarly, telecommunications cabling is routed away from large motors, generators, induction heaters, arc welders, x-ray equipment, and radio frequency, microwave or radar sources.

*Note: Distance recommendations from (1990) TIA/EIA-569 are reproduced here by popular request. For current recommendations, refer to NEC/NFPA 70, Article 800-52.
Firestops

Annex A of the standard discusses various types of packing used to re-establish the integrity of fire-rated structures when these barriers have been penetrated by cable. This section briefly discusses passive mechanical systems and non-mechanical systems such as putty, caulk, cements, intumescent sheets and strips, silicone foams and pre-manufactured pillows. The most common method is stuffing all apertures with ceramic/mineral wool and caulking both sides with fire-resistant putty. The information refers the designer to check manufacturer specifications and UL ratings against NFPA, ASTM and NEC codes.

Cut-a-way of Typical Firestop