Components of Structured Cabling

- ANSI/TIA-568 Commercial Building Wiring Standard
  - Also known as structured cabling
- The wiring standard describes the best way to install networking media to maximize performance and minimize upkeep
  - The principles apply no matter what type of media, transmission technology, or networking speeds are involved
- Structured cabling is based on a hierarchical design and assumes a network is based on the star topology

From the Demarc to a Workstation (1 of 11)

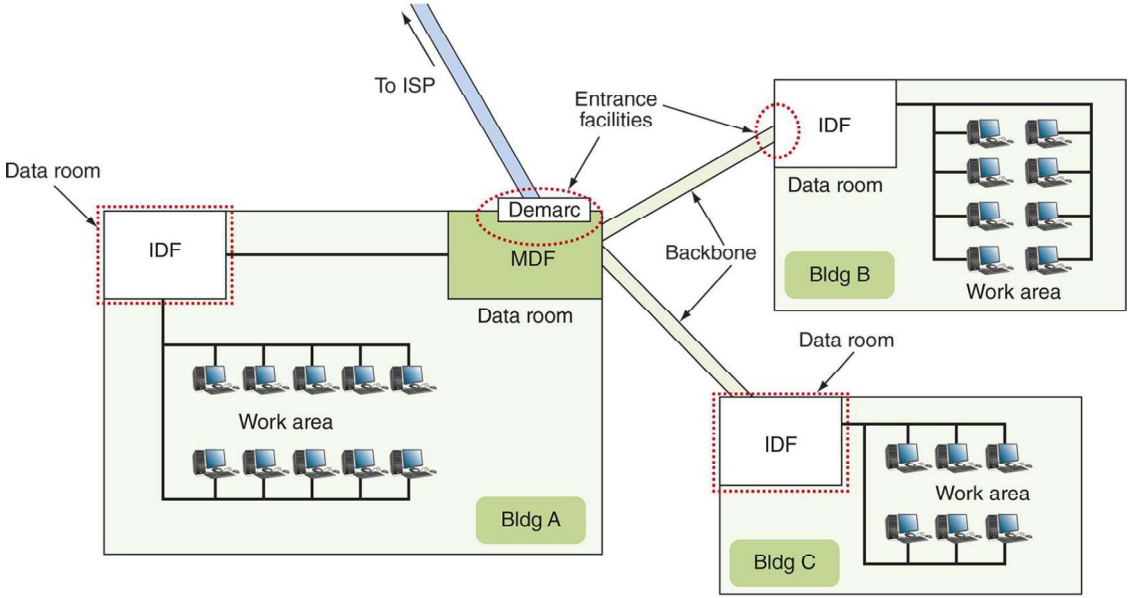

Figure 2-1 ANSI/TIA structured cabling in a campus network with three buildings

Figure 2-1 ANSI/TIA structured cabling in a campus network with three buildings

From the Demarc to a Workstation (2 of 11)

- Entrance Facility in Building A:
  - **EF (entrance facility) –** location where the incoming network (such as Internet) connects with the school or corporate network
  - **Demarc (demarcation point) –** the device that marks where a telecommunications service provider's network ends and the organization's network begins
  - **MDF (main distribution frame) –** the centralized point of interconnection for an organization's LAN or WAN (also called MC or main cross connect)
  - **Data room –** an enclosed space that hold network equipment (also called data closet, data center, equipment room, or telecommunications room)
  - **Rack –** holds various network equipment
  - **Patch panel –** a panel of data receptors which can be mounted to a wall or a rack
    - A patch panel provides a central termination point when many patch cables converge in a single location

From the Demarc to a Workstation (3 of 11)

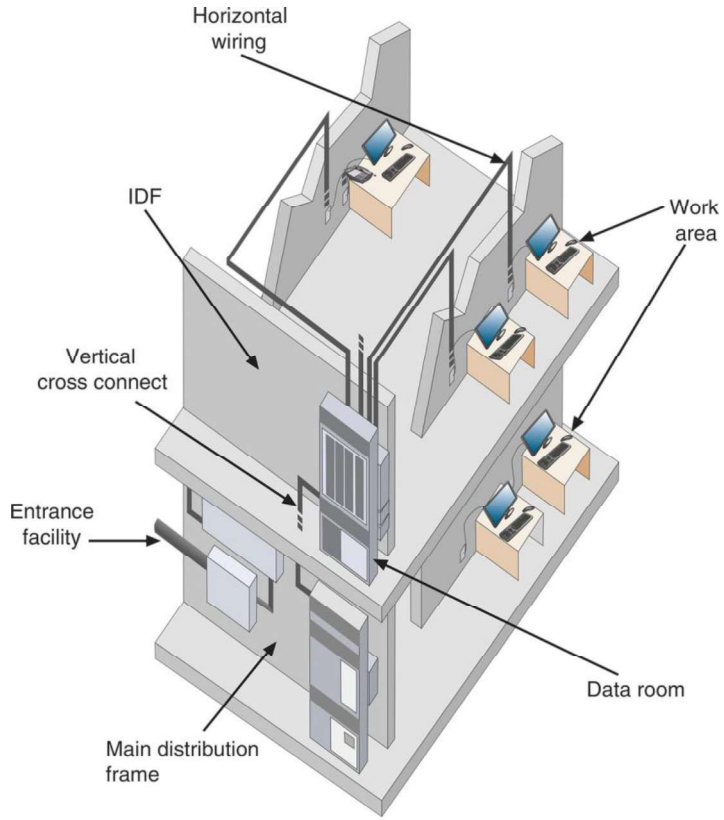

Figure 2-2 ANSI/TIA structured cabling inside a building

Figure 2-2 ANSI/TIA structured cabling inside a building

From the Demarc to a Workstation (4 of 11)

Figure 2-3 Demarc for Internet service to a campus network; this demarc is located inside a small data room and connects the incoming fiber signal from the ISP with the campus's Ethernet network

Figure 2-3 Demarc for Internet service to a campus network; this demark is located inside a small data room and connects the incoming fiber signal from the ISP with the campus's Ethernet network

From the Demarc to a Workstation (5 of 11)

Figure 2-5 Patch panel on rack

Figure 2-5 Patch panel on rack

From the Demarc to a Workstation (6 of 11)

- Entrance Facility in Building A (continued):
  - VoIP telephone equipment – VoIP (Voice over IP) is the use of any network to carry voice signals using TCP/IP protocols
  - In one or more data rooms you might find the following:
    - VoIP gateway
    - VoIP PBX
    - VoIP endpoints
- Data Room in Building B:
  - IDF (intermediate distribution frame) – provides an intermediate connection between the MDF and end-user equipment on each floor and in each building
- Work Areas in All Three Buildings:
  - Work area – encompasses workstations, printers, and other network devices
  - Wall jacks – the ANSI/TIA standard calls for each wall jack to contain at least one voice and one data outlet

From the Demarc to a Workstation (7 of 11)

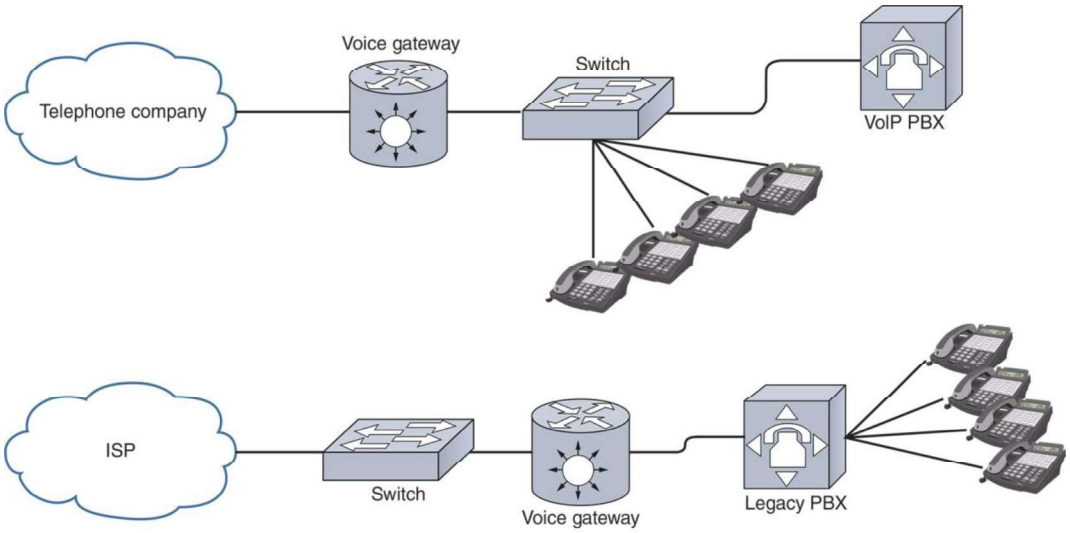

Figure 2-7 VoIP equipment can connect VoIP phones to an analog telephone line or an analog phone system to the Internet; there are pros and cons to each approach

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From the Demarc to a Workstation (8 of 11)

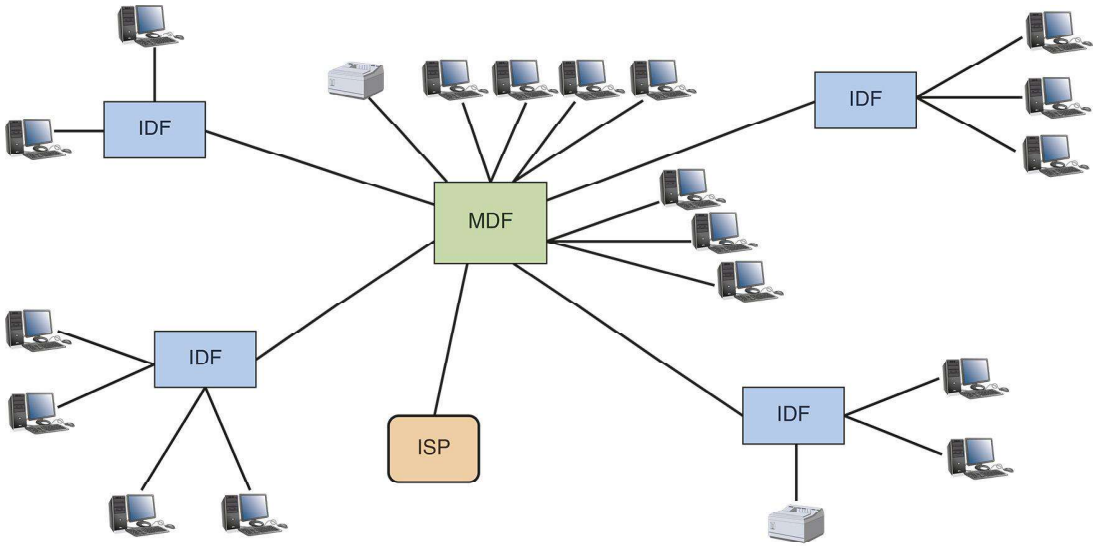

Figure 2-9 Workstations branching off IDFs that branch off an MDF create an extended star topology

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From the Demarc to a Workstation (9 of 11)

- Rack Systems
  - Racks come in two-post and four-post varieties (though six-post racks are also available)
  - Racks may be wall- or ceiling-mounted, freestanding on the floor, or bolted to the floor
  - Consider the following when purchasing racks:
    - Height – rack height is measured in rack units (RU or U) with the industry standard being 42U tall
    - Width – equipment racks come in a standard 19-inch frame (19 inches wide)
    - Depth – rack depths vary between manufacturers
  - In data centers containing multiple rows of racks, a hot aisle/cold aisle layout pulls cool air from vents in the floor or from low-lying wall vents into rows of racks (see Figure 2-14)

From the Demarc to a Workstation (10 of 11)

Figure 2-11 Open two-post racks and enclosed four-post racks

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From the Demarc to a Workstation (11 of 11)

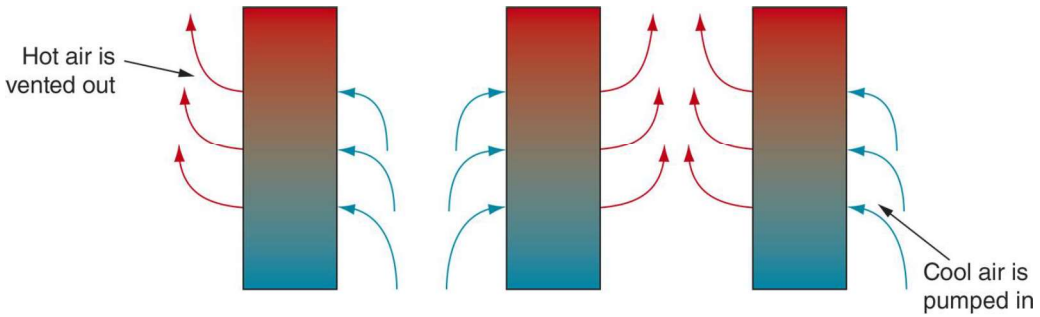

Figure 2-14 Hot aisle/cold aisle rack layout

Figure 2-14 Hot aisle/cold aisle rack layout

Cabling (1 of 5)

- Types of Cables
  - **Patch cable –** a relatively short length of cabling with connectors at both ends
  - **Horizontal cabling –** connects workstations to the closest data room and to switches housed in the room
  - **Backbone cabling –** consists of cables or wireless links that provide interconnection between the entrance facility and MDF and between MDF and IDFs
  - Many network problems are the result of poor cable installations
    - Pay close attention to the quality of cable connections and cable management

Cabling (2 of 5)

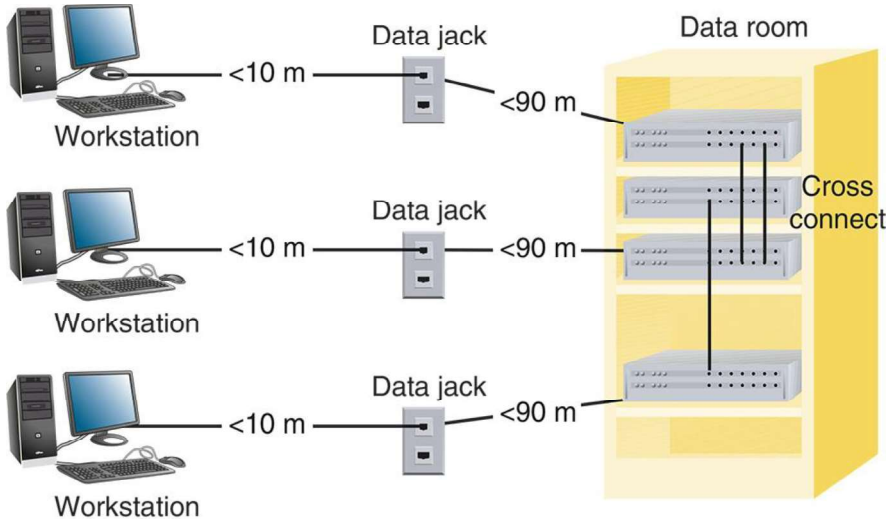

Figure 2-15 Horizontal cabling from a switch in a data room to workstations

Figure 2-15 Horizontal cabling from a switch in a data room to workstations

Cabling (3 of 5)

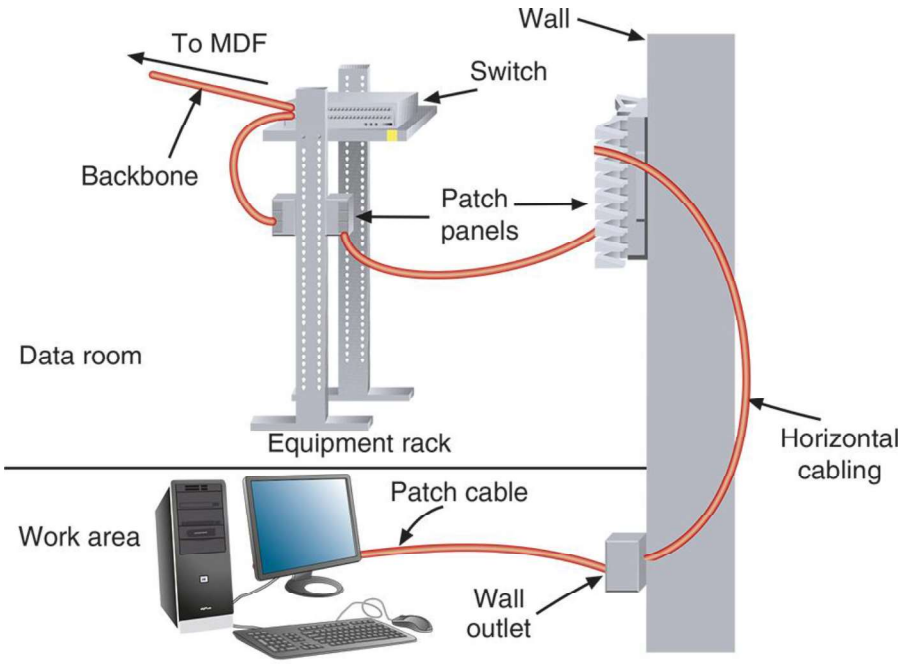

Figure 2-16 A typical UTP cabling installation

Figure 2-16 A typical UTP cabling installation

Cabling (4 of 5)

- Cable Management
  - **Termination –** when terminating twisted-pair cabling, don't leave more than 1 inch of exposed cable before a termination
  - **Bend radius –** do not exceed the cable's prescribed bend radius, which is the radius of the maximum arc into which you can loop a cable without impairing data transmission
  - **Continuity –** use a cable tester to verify that each cable segment transmits data reliably
  - **Loosely cinch cables**
  - **Cable coverings and conduits –** avoid laying cables across a floor and use cord covers if they must be exposed
  - **EMI sources –** install cable at least 3 feet away from fluorescent lights or other sources of EMI (electromagnetic interference)
  - **Plenum cabling –** if running cable in the plenum (the area above the ceiling tile or below subflooring), make sure the cable sheath is plenum-rated

Cabling (5 of 5)

- Cable Management (continued)
  - **Grounding** - pay attention to *grounding* requirements
  - **Slack in cable runs**
  - **Cable trays** - use cable management devices such as *cable trays*, braided sleeving, and furniture grommets
  - **Patch panels** - use *patch panels* to organize and connect lines
  - **Company standards and inventory**
  - **Documentation**
    - Keep your cable plant documentation accessible
    - Label every data jack or port, patch panel and connector
    - Use color-coded cables for different purposes
    - Update your documentation as you make changes to the network