Deanship of Information Technology

Structured Cabling Policy

Net-P1-r1

Introduction

Taif University depends on a strong , flexible, and high quality communications network infrastructure to accomplish the mission of the University.
The communications infrastructure supports all the functions through the support systems. Information Technology Services is responsible for the installation and maintenance of this communications infrastructure.
Constant change in communications technology drives the specifications within this document. The communications infrastructure within a building represents a fifteen- to twenty-years of investment.

Planning and Design

- All construction and renovation projects in University campus requires communication services from ITS must include this document as part of the projects scope of work.
- ITS staff must be actively involved in the review of the communication infrastructure design from beginning of construction.
- ITS infrastructure group must approve all communications designs, drawings and any modifications to the specifications listed in the Structured Wiring Plan.
- The Project Manager from the Engineering management should schedule regular design meetings with ITS Communications Infrastructure representative, ITS Network Engineering representative and the contractor(s) .

SCOPE OF WORK

- Work includes providing all materials, equipment, accessories, services and tests necessary to complete and make ready for operation by the Contractor for structured cabling system in all Buildings in accordance with Drawings and Specifications.
- Contractor shall provide a Complete End to End Structured Cabling System for Buildings covered under Project with Complete Structured Cabling System.

QUALITY ASSURANCE

- Manufacturers Qualifications: Firms regularly engaged in the manufacture of structured cabling system of types, and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

- Standards Compliance: Comply with the latest editions of the requirements of applicable local codes, and the following standards: -

    1. Electronic industries association (EIA), Telecommunications industries association (TIA) for commercial buildings.
    2. The institute of electrical and electronic engineers, Inc. (IEEE).
    3. International organization for standardization (ISO).
    4. American National Standards Institute (ANSI).
    5. International Electromechanical Commission (IEC).
    6. ISO 11801.

- All Work must be installed by system manufacturer's certified system installers / vendors who are certified and experienced in implementing the selected structured cabling system and to perform all related testing programs

SUBMITTALS

- Product Data: Submit manufacturers' data and installation instruction details for structured cabling system.
- Single Line Diagram: Contractor to provide a complete detailed single line diagram showing all of the system components, part numbers, etc.
- Shop Drawings: Submit dimensional layout on architectural background drawings.
- Samples: Submit samples from all passive components like Cables , Patch Panels and connectors .

EQUIPMENT WARRANTY

- The system manufacturers shall provide an acceptable warranty on all passive components including the structured cabling system. These warranties shall be provided in written certificate form.
- The system manufacturers shall provide in writing to the Project Manager that in event of the demise or failure of the installing certified system installer/vendor, the

manufacturer shall be responsible for providing another certified system installer/vendor to fulfill the remainder of the warranty conditions.

- The Contractor shall provide a guaranteed twenty-four (24) hour response time to any warranty claims.

A structured cabling system, as defined by the TIA/EIA, consists of six subsections:

1- **Horizontal Cabling**
2- **Backbone Cabling**
3- **Work Area (WA)**
4- **Telecommunications Room (TR)**
5- **Equipment Room (ER)**
6- **Entrance Facility (EF)**

1- Horizontal cabling :

- The horizontal cabling system encompasses everything between the telecommunications room cross-connects to the telecommunications outlets in the work area. the cable typically runs horizontally above the ceiling from the telecommunications room, which is usually on the same floor.

1.1- Horizontal topology:

- The horizontal system shall be installed in a star topology
- Each work-area telecommunications outlet shall be connected to the horizontal cross-connect in the telecommunications room.
- The telecommunications room should be on the same floor as the work area.
- Bridge taps and splices shall not be installed for copper cable.
- No more than one transition point or consolidation point shall be installed. (The exception comes later.)
- Electrical components shall not be installed as part of the horizontal cabling. No application specific components can go there either. They can go next to the outlets or cross-connects.
- One single or Double Data outlet (Depend on the site survey) shall be installed for each work area.
- Every building must contain at least one telecommunications room, and it should be on the floor it serves.

1.2 - Maximum horizontal distances:

- Horizontal run: 90 meters (295.3 ft.) from the telecommunications outlet to the horizontal cross-connect.
- Work-area patch cord: 5 meters (16.4 ft.) Maximum .
- Total of work-area and cross-connect patch cords, equipment cables, jumpers, etc: 10 meters (32.8 ft.).
- 3 meters of the cable inside the Telecommunication Room for future use.
- 10 cm of the cable inside the faceplate for future use.

1.3 - Recognized media :

1.3.1 – Cables

You can use these cables individually or in combination :

- 4-pair, 100-ohm UTP or STP cable .
- 2-fiber (or more) 50- and 62.5-micron fiber optic cable .
- 150-ohm shielded twisted-pair cable is recognized, but not recommended.

1.3.2 - Connectors

- 8-position modular jack and plug with T568B pinning.
- SC fiber connectors.
- LC fiber connectors.

1.3.3 – testing and Labeling :

- All cables, components and items of equipment are to be fully marked with positively fixed labeling devices to facilitate identification.
- Identification shall include user outlet number, floor number, location & service.
- Final numbering scheme to be approved by the Project Manager prior to installation.
- The contractor shall submit a marking system for approval by the Project Manager.
- The University shall have the right to schedule acceptance testing at its convenience.
- A University representative, at the option of the University, shall be present during testing.
- Such acceptance testing shall in no way reduce the Contractors' obligations regarding restoration, clean up or warranty.

- Contractor shall perform tests necessary to ensure that the installed cables will pass acceptance testing performed in conjunction with University representatives.
- Contractor shall be responsible for performing, tracking, and recording the results of tests.
- Contractor shall be responsible for providing equipment and materials necessary for as long a period of time as necessary to complete testing to the satisfaction of the University.
- Test record forms shall be agreed to by the University prior to the commencement of acceptance testing.

2- Backbone cabling

The backbone system encompasses all the cabling between telecommunications rooms, equipment rooms, entrance facilities, and between buildings.

- The backbone system shall be installed in a hierarchical star topology.
- From the horizontal cross-connect, there shall be no more than one additional cross-connect to reach the main cross-connect.
- There should be no more than two levels of backbone cross-connects.
- There shall be no bridged taps and splitters.
- Make sure you meet all grounding requirements.
- Install away from a building's physical plant systems, such as electrical wiring, plumbing, and sprinklers. Do not install backbone cable in elevator shafts.
- Make sure your backbone cable and all equipment and telecommunications rooms are inaccessible to unauthorized personnel.
- Pay attention to all fire regulations.
- Air spaces should be examined for dampness, which can corrode copper cable. In addition, take into account all pathway standards and requirements.
- Use 1 Terabit fiber to connect runs between buildings and for the vertical riser within a building .
- 3 fibre connections (6 cores terminations) for every fibre Patch Panel .
- 12 core Single mode Fibre Optic cable should be used between buildings.

- To interlink communications rooms or cabinets within a building use :

  a. 6 core Multimode OM3 cable to be installed internally within a building only

  b. 6 core Singlemode fibre

3-Work area

The work area consists of all the components between the telecommunications outlet and the user's workstation equipment.

- UTP wiring should follow T568B schemes.
- The 4-pair UTP patch cable from the telecommunications outlet to the workstation equipment should be no more than 5 meters
- Make sure the equipment cords, patch cables, and modular jacks all have the same performance rating.
- Follow standard installation practices and maintain proper pair twists, bend radius, etc.
- Use different pathways for electrical wiring and structured cabling.
- Estimate pathway capacity at 20–40% fill.
- Run an independent pathway to control centres, reception areas, and other high-activity spaces.

3.1 - Data Outlet requirements and specifications and room layout

- 1 data outlet (single or double) should be allocated to each staff desk position, for ease of connection (CAT6 , 100-ohm, 8-position modular jack) .
- Teaching and research facilities may have less / more data points dependent on the user specification .

3.2 - Wireless Network specifications

3.2.1. Wireless data points

- In general terms a double data points at high level (or ceiling level) are sufficient to service a wireless access point.
- The access point will receive power via the data cable and therefore no power supply is required.
- A double high level data point every 25 meters or a double high level data point for each 20 potential users of the wireless system

• At least one double high level data point is required for every meeting room

• Meeting rooms\ Seminar rooms with capacity for more than 20 users should have sufficient high level data points to accommodate every user and these data points must be distributed evenly around the working space.

• In a high density environment, data points must be distributed directly above the user group in the ceiling and must be easily accessible.

• In a less dense environment, data points must be centrally located.

• Access points can be mounted on suspended ceilings for indoor Access points .
• Access points can be mounted on walls or poles for outdoor access points.
• 2 data point to serve each wireless access point should be allocated per 20 users or 1 per 20 meters whichever is appropriate

3.3- The labeling of the Data points on the face plates

• Cabinet: Each floor or Communications cabinet should be identified by using an agreed Number (C1, C2 , C3 , etc.) .
• Patch Panel: Each data patch panel should be identified by (P1 , P2 , P3) from the top of the cabinet.
• Socket: The number on the patch panel should be used, on a 1 to 24 way panel the max number should be 24, on a 1 to 48 way panel the max number should be 48,
• E.g. C1-P1-01 this is Floor 1 cabinet , Patch panel 1 , point number 1 E.g. C2-P3-15 this is cabinet 2 Patch panel 3 point number 15 .

4- Telecommunications room

• The telecommunications room holds the termination equipment needed to connect the horizontal wiring to the backbone wiring.
• A building must contain at least one telecommunications room, and it should be on the floor it serves.
• Place the telecommunications room as close as possible to the centre of the floor.
• Do not share the telecommunications room with electrical equipment.
• You should have at least one telecommunications room per floor.

- If the floor area is greater than 1000 $m^{2,}$ or if the distance to the work area exceeds 92 m, there should be additional telecommunications rooms per floor.
- When there are multiple telecommunications rooms on a floor, interconnect them with at least 2 cable trays.
- Specific room sizes are minimum 2x3 m^2.
- Racks to be 18U , 27U or 42U 800mm x 900mm with 900mm space at front
- Each rack to be supplied at minimum with 2 x 15A drop - down pendants for power, unless otherwise specified.
- Power must be on its own dedicated circuit, and preferably each of the two from separate circuits.
- All racks are to be lockable with communications rack key
- Overall capacity to allow for 30% growth of outlets in the rack
- Room to be Permanently locked and keyed
- Do not install a false ceiling.
- Environmental such as power and air- conditioning to be sufficient to supply heat and power load
- Lighting should be sufficient.
- Walls, floor, and ceiling should be light colored to enhance lighting.
- HVAC equipment should provide continuous 24/7/365 service.
- Fire protection should be provided
- The door should be at least 910-mm wide and 2000 millimeters high.
- Install at least two dedicated duplex electrical outlets on separate circuits. If necessary, additional duplex outlets can be placed around the room.

5- Equipment room

The equipment room houses telecommunications systems, such as servers. It's different than the telecommunications room because of the complexity of the components. An equipment room may take the place of a telecommunications room or it may be separate.

Each building should contain at least one equipment room or telecommunications room.

- Only install equipment related to the telecommunications system.
- Consider future expansion when sizing and placing the equipment room.
- Design the door to accommodate the delivery of large enclosures and equipment. The door should be a minimum of 910 mm wide and 2000 mm high. A double door without a center post is best.
- The minimum ceiling height shall be 2.4 meters. No false ceilings either.

- The minimum recommended size is 2x3 m^2.
- The room should have conditioned power and backup power.
- Protect against vibration, EMI, contaminants, and pollutants. The room should not be near mechanical rooms, electrical distribution panels, and wet/dirty areas.
- Take into account any water infiltration issues. Do not locate the room below water level.
- Like the telecommunications room, provide 24/7/365 HVAC. Temperature and humidity should be controlled.
- Lighting should be sufficient

6- Entrance facility.

The entrance facility (EF) is the point where the outdoor plant cable connects with the building's backbone cabling. This is usually the demarcation point between the service provider and the customer owned systems. The entrance facility includes:

- Cables.
- Connecting hardware.
- Protection devices.

6.1- Design considerations.

- The entrance facility may also house the backbone links to other buildings in a campus.
- Public network interface equipment and telecommunications equipment may be in the entrance facility.
- The location should be a dry area, near the vertical backbone pathways.
- The entrance facility should be provisioned as the telecommunications room is for environment, HVAC, lighting, doors, electrical power, etc.

7- Pathways

- Cable risers and pathways to be independent from all other services
- Main Indoor cable pathways shall be cable tray and Shall allow for 25% spare capacity for future growth
- Cable pathways above solid or feature ceilings to be cable tray, with appropriate access panels to be installed for future access.
- Intrabuilding backbone pathways run vertically and horizontally between the entrance facilities, equipment room, and telecommunications room(s).

- Make sure all pathways are fire stopped. And, do not use elevator shafts as backbone pathways.
- When designing a building, stack the telecommunications rooms vertically above one another on each floor. This provides for the easiest and most efficient backbone runs. The TRs should have a minimum of three 4-inch sleeves for floor areas of 5000 m^2. One sleeve is for the cable; the other two are spares.
- Horizontal backbone pathways: If the TRs are not stacked vertically, use 4-inch conduit to connect them horizontally. You should have no more than two 90° bends between pull points. In addition, the fill should not exceed 40% for any run greater than two cables.
- Use Cable trays for Horizontal pathways , pathways run horizontally between the telecommunications room and the work area. Trays should be located above the ceiling.
- Make sure your telecommunications cables and power cables are separated.
- When designing a building, . The Rooms should have a minimum of 2x 2-inch PVC Pipe in every room for future using and its connected to the trays above the ceiling .
- In existing rooms , its not allowed to use a trunks If you need to add outlets to the room . you should cut the wall and use PVC Pipes inside the wall .