City of Albuquerque
Department of Technology & Innovation

Standards/Policies for Network Infrastructure

PURPOSE: This section describes installation standards and procedures for network infrastructure.
SCOPE: Applies to the network infrastructure in all City owned or leased facilities
REVISED: 1/2017

The DTI Network group is responsible for all design, installation, and maintenance of networks in City owned and leased facilities. The DTI Network group will work with department program and procurement staff to provide appropriate quotes and contract information to aid with the purchase of all City network equipment and services.   This includes, working with City contract and architecture staff in the design of any remodel or construction projects. All devices connecting to the City's intranet must support TCP/IP.

Network Equipment Specifications:
1. Switches must comply with all of the following:
   a. Enterprise level switches manufactured by Cisco
   b. Must be configurable by console port/command line
   c. Must have LAN based image or higher (No LAN-Lite images)
   d. Must support encryption (No NPE Images)
   e. Dual power supplies shall be purchased whenever possible
   f. Must be compatible with the Cisco Prime Infrastructure
   g. Must support IEEE 802.3at (PoE+)
   h. Manageable by SNMP

2. Routers must comply with all of the following:
   a. Only Enterprise level routers manufactured by Cisco
   b. Must be configurable by console port/command line.
   c. Must have IP Services image or equivalent (Full support of EIGRP and BGP)
   d. Must support encryption (No NPE Images)
   e. Dual power supplies shall be purchased whenever possible
   f. Must be compatible with the Cisco Prime Infrastructure
   g. Manageable by SNMP

3. Wireless Access Points must comply with all of the following:
   a. Only Enterprise level WAPs manufactured by Cisco
   b. Must be compatible with Cisco Prime Infrastructure
   c. Must work with Cisco Wireless Controllers except in certain use cases when approved by the DTI Network Manager
   d. All SSIDs connecting to the Intranet must utilize WPA2 Enterprise for encryption and authentication.
   e. Must have dual 2.4 and 5ghz radios with 802.11n support.
   f. Must support Cisco Clean Air technology for spectrum analysis

4. IP Telephony
   a. Must be manufactured by Cisco
   b. Must be supported by Cisco Call Manager 10 or higher
   c. Must support 1gig connectivity
   d. Desk phones shall have two ports, allowing for PC connectivity through the phone
   e. Plug-in's or additional telephony software or features must integrate with the current Cisco Call Manager environment.

MDF/IDF Specifications:
1. MDF/IDF's should be located so no cable run exceeds 90 meters (approx. 270ft.) in length. Multiple floors can be connected to an MDF/IDF if the cable length is not exceeded.
2. The MDF/IDF should be at a minimum 8'x8' if it is not shared with anyone else. Shared closets require at least 6'x8' of MDF/IDF space. The telephone equipment may reside within the MDF/IDF.
3. If multiple floors are to be pulled to one MDF/IDF, appropriate wire chassis must allow easy access between floors.
4. MDF/IDF's will be interconnected by the City's WAN. The exact MDF/IDF interconnections will be determined by DTI Networking.
5. Each MDF/IDF will have a minimum of two duplex 20Amp / power outlets. These outlets require dedicated power/breakers.
6. City staff and/or DTI Network may require a 30Amp dedicated outlet, depending on project needs.
7. Each cable pulled into the MDF/IDF shall be clearly and uniquely marked as to origin.
8. All Patch Panels will be ordered with 110 connectors on the back,(i.e., Siemon, Leviton Patch Panels), to be wired T568B standards. Patch panel should be numbered to match connected faceplate in the office.
9. Cables pulled by Contractor require 10' of slack left at the MDF/IDF.
10. All cabling must be a minimum of CAT6.   In the case of CAT6 being cost prohibitive, the Network Manager may approve the use of CAT5e.
11. A minimum of two 4-inch entrance conduits must be installed containing four 1" innerducts with pullstring.
12. A minimum of a 4'x4' fire rated backboard with #6 ground tied to building ground.
13. Wall mounted cabinets must be in a serviceable location not exceeding 8' from the floor. Horizontal cabinets must be a minimum of 24" deep.   Cabinets must be keyed to match existing cabinet keys. Location must be approved by DTI Network Group.
14. MDF should not be used for storage. Network equipment requires a 5' clearance of any obstructions.
15. MDF/IDF must have proper environmental controls and ventilation to prevent equipment malfunction/failure.

ICO (Integrated Communications Outlet) Specifications:
1. Each office shall have at least one ICO
2. At each ICO location, a standard 2"x4" wall box, at the same height as existing electrical outlets, shall be installed.
3. At least two (2) CAT6 (unless approved for CAT5e by Network Manager), 4-pair cables will be installed from each ICO, to the MDF/IDF for data.
4. All ICO cables for new construction shall be run from ICO to MDF/IDF in a minimum of 1" conduit.

5. ICOs will not be daisy chained.
6. Under carpet cable shall not be used. If an ICO must be installed in the middle of a room, it must be fed by conduit that is secured in place by appropriate methods.
7. Twelve inches of service loop shall be left in cables at each ICO
8. All cable runs must be reflected in the As-Built diagrams
9. Note that all manufacturers' requirements regarding the installation practices are to be followed. This includes insuring that the minimum bend radius of installed wiring is maintained. Cables are to be routed so that no cable run is in excess of 90 meters in length. All installation is to be done in accordance with the EIA/TIA 568b Commercial Building Telecommunication Wiring Standard.
10. All wall face plates and floor face plates must be numbered for identification. Each ICO must be numbered to match the patch panel in the MDF/IDF.
11. All new cable installations must include patch cables for both the end user and for the network switch termination.   The standard is one 15' and one 3' for each data run.   Any variation to these cable lengths must be approved by DTI Networking.
12. All cabling systems will be thoroughly tested for continuity and correct termination sequence. The criteria for testing cable are length, exposure to electromagnetic interference, and other conditions that might cause transmission problems. Testing tools should test for reversed, opened, shorted, and transposed pairs, and verifies the cable is within parameters of NEXT, impedance, capacitance, and ACR.

Fiber Optic Specifications:
1. Multi-mode and single-mode fibers are both utilized at the City. In all cases of multi-mode-fiber installation,
50 micron will be used, unless 62.5 is required for backward compatibility of existing fiber.
2. Direct burial of fiber optic cable is not allowed.
3. When installing fiber optic cable in ductwork and manholes between buildings, there shall be a minimum of one complete loop; minimum of 12 feet in length, in the manhole and it shall be pulled in a protective liner inside the manhole to prevent damage to the cable.
4. All fiber optic cables shall be terminated with LC type connector and properly connected to the FDU. Fiber cable metallic sheath if attached shall be properly grounded.
5. When installing fiber optic cable, in existing conduit that is not Multi-Cell or does not contain flow duct, it shall be pulled in a protective textile innerduct, minimum 1 inch inside diameter. When placed in a cable tray or on a runway where there is the possibility of someone standing, walking or sitting on the cable, it shall be placed inside a protective liner. When floor duct is utilized one chamber will be used exclusively for the fiber.
6. All cable placed along runways, relay racks and distribution shelves shall comply with the manufacturer's minimum bend radius requirements for that particular type cable. Cable is to be secured by Velcro so as not to be pulled tight at any point that causes the cable jacket to be crushed flat or indented.
7. Use vertical and horizontal wire management on relay racks to accommodate the fiber cable to be dressed into the fiber terminating enclosures.
8. There should be a minimum 12ft. service loop mounted in a circular configuration on fire rated plywood (3/4 in. thick) in accordance with NEC standards.
9. All fiber strands shall be terminated in accordance with industry standards with LC Connectors in and rack mounted FDU. Kevlar strain relief should be tied inside the service access of the FDU. Rigid member should be secured in the service access of the FDU using applicable hardware

provided with the FDU. Inner shielded fiber strands should have a minimum 3ft. service loop inside the service access of the FDU.

10. All strands must be tested using an optical time domain reflectometer (OTDR) and/or optical loss test sets (OLTS).
11. Installation of fiber optics in City facilities must include fiber patch cables of an appropriate length unless prohibited by an existing Franchise agreement.