

TECHNOLOGY EXECUTIVE SUMMARY

The District is facing several challenges in regards to the technology used in the District today. Among some of those challenges include campus wide cable plants with limited throughput capability, voice and data equipment that has exceeded end of life and a wireless infrastructure that is not capable of supporting current or future technologies.

Several facilities have telecommunication rooms that do not meet industry standards in regards to HVAC support and protection from power outages or surges, the equipment is not bonded to an effective grounding system and the rooms are occupying shared spaces that leave the District network vulnerable to accidental disconnects or damage. A loss of network capability in a facility will impact telephone communications and security systems.

The existing cable plant in many of the facilities is in excess of 17 years old and is no longer considered an industry supported standard. The majority of the voice and data equipment have mainly exceeded end of life. The fiber backbone used on the campuses today is not capable of supporting future higher data transmission rates and should be replaced.

The majority of the classroom technology such as projectors, wireless access points, interactive white boards etc do not all meet the District standards. Establishing parity in the classroom technology systems amongst all grade levels at all campuses will be a priority.

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Executive Summary

- This assessment reviews the major components of the District technology infrastructure used to support communications and educational content delivery to the students and staff in Weatherford ISD. The infrastructure includes the physical cable plant that connects the users to the telecommunication rooms and the buildings to the District NOC. The assessment also examines the current state of technology equipment in use in the classrooms within the District and the hardware used in the telecommunication rooms and the NOC.
- The assessment does not examine the District use of software for educational, administrative or I.T. security platforms or the age and usefulness of other District peripherals such as student workstations.

Outside Plant and Pathways

- All of the educational facilities in the District are connected with 12-strand single mode fiber that is leased through the city of Weatherford. The District pays \$30,000 a year for the use of the fiber and the city in return handles all maintenance and right of way issues. There are no issues with the connectivity provided under this agreement.
- The Hall Art Building and the baseball Fieldhouse each connect to the District WAN via a wireless bridge that provides basic connectivity. The system does not meet the desired standards for WISD in regards to the capability of all network backbone connectivity.
- Portable buildings and ancillary buildings connect back to the main campuses via a mix of cabling types.
 - Wright, Hall, Martin portables connect to the LAN with Cat5 cabling. The Curtis and Austin portables, by way of comparison, connect with 2 pair of fiber optic backbone.
 - The maintenance building connects to the field house building at the stadium via a Cat5 copper backbone.
 - All other ancillary buildings (Child nutrition, Outback at WHS, Ninth Grade center facilities and the stadium) use multi-mode fiber optic backbone to connect to the District LAN.

Telecommunications Pathways and Spaces

- Campus MDF and IDF rooms provide a wide array of support functions for the WISD network. The rooms are responsible for supporting and protecting all of the campus network electronics and serve as the interconnecting point for the data cabling used by the students and staff to the WISD Wide Area Network (WAN). The MDF rooms also support other low voltage trades such as the surveillance storage servers, the access control panels and the intrusion alarm panels (typically).
 - The rooms should meet industry standards in regards to size, (an MDF should be sized approximately 10'x15' and IDF rooms should be a minimum of 10'x8') this allows for compliance with the National Electric Code working clearances around the equipment at 36" around all sides of the equipment racks.
 - The MDF and IDF rooms should have the dedicated environmental support needed to provide 24 hour cooling for the electronics.
 - The rooms should be properly supported with electrical power and the equipment protected via bonding to a properly installed telecommunications grounding backbone.
 - The rooms should be dedicated spaces and the room doors keyed apart from the standard campus or District door core to prevent unnecessary trespassing.
 - The rooms should not be used as storage spaces or be mixed with electrical panels or put inside electrical rooms, classrooms or other shared spaces. The rooms should never be used for custodial closets.
 - The rooms should never be placed adjacent to other rooms supporting or containing water pipes such as restrooms or riser rooms.
 - Ceiling spaces should consist of lay in acoustical tiles to allow both access to the overhead cable pathways and to make cooling of the equipment more efficient.

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- The District MDF and IDF rooms face a variety of challenges based on the age of the buildings to the condition of the overall room the equipment occupies. Most of the telecom rooms in WISD face the following issues:
 - No grounding bars
 - Located in shared spaces including storage areas
 - Do not meet the industry recommended standards for room size.
 - Lack dedicated HVAC in all telecom rooms.
- The vertical wire management used to manage the cabling around the equipment racks have in some cases, exceeded their fill capacity and the cabling is now vulnerable to being snagged or accidentally tripped on.
- The cable pathways are critical to the proper support of the District infrastructure. Improper pathways can impact the quality and functionality of the cable plant to deliver time sensitive applications such as voice and video. According to the WISD Technology team there are a number of pathways and cable plants that are over 17 years old and lacked the guidance of the industry standards in regards to the pathway installations. As a result the majority of the cables pathways in WISD are not to industry standard, contain zip ties which can deform and damage the cable, rest on electrical conduits that can interfere with the data signaling or cable is resting on the ceiling grids or tiles etc. The pathways located on the ceiling tiles will be impacted during any renovation work that requires the ceiling grids to come down. The result can lead to damaged cabling and a loss of network services. The campuses most likely to have issues with the current pathways are:
 - Austin ES
 - Wright ES
 - Hall MS
 - Curtis ES
 - Tison MS
 - Martin ES
 - Crockett ES
 - Bowie ES
 - Travis ES
- Austin ES has issues with rodents chewing on the cabling inside the crawl spaces.

Network and Voice Electronics

- The District primary standard for their network electronics is a Cisco layer 3 switches placed in each campus MDF. Edge devices include Cisco and some older Linksys equipment. The devices are equipped with WISD Standard 10/100/1000 ports that can provide Power over Ethernet (PoE) and come in 24 and 48 port versions.
 - Some power injectors are still used on some campuses in lieu of PoE from the switch.
 - The majority of the equipment is no longer under warranty and there is equipment that has exceeded its end of life by the manufacturer.
- UPS protection is a concern for the District. A lack of properly sized UPS systems can leave the equipment vulnerable to issues and failures resulting from power outages or power surges.
 - The District has lost some equipment in the past to lightning strikes and power outages.
 - None of the IDF rooms contain a UPS device to protect the switch gear in the room.
- The District has a new Network Operations Center (NOC) located near the Administration building. The NOC has dedicated HVAC, grounding protection and UPS equipment to protect the core electronics. The NOC does not have a generator however and large scale power outages will render the entire campus network inoperable as a result.
- The District voice systems consist of Voice over IP (VoIP) platform from Asterisk with Polycom handsets deployed to the majority of classrooms and office spaces in the educational facilities. All classrooms have phones installed in them. There are issues with some of the VoIP servers and their RAID capability. The servers are slated to be replaced in the summer of 2014.

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- The campuses are currently equipped with wireless network capability. The new wireless standards will not work with the current cable plant at any WISD facility that does not contain Category 6 cabling. Any new wireless access point being considered should support the new 802.11ac standard and be outfitted with a minimum of two Category 6 cables. The use of category 6A cabling in lieu of Category 6 at the wireless locations could be considered but it is not mandatory to upgrade to 6A. The District should consult with the manufacturer of the wireless access point systems that will be used to deliver the new 802.11ac standard before making a final decision on the supporting cable plant.

Cabling Infrastructure

- The current standard for cabling today in WISD is Category 6 for all new construction or renovations. The cabling used in the campuses today is approximately 17 years old.
- According to the WISD Technology Department, the majority of the campuses are cabled with an older Category 5 cable plant. This cabling category is no longer recognized by the telecom industry and it is not recommended for any high speed data transmissions above 100 Mbps.
- Some campuses are cabled with Category 5e cabling. This is the most widely used category cable in the industry today and supports throughput from 10/100/1000 Mbps. Despite its widespread use the new 802.11ac standards for the next generation of wireless access points no longer recommends the use of Category 5e cabling and instead recommends a minimum of Category 6 or 6A cable for all new wireless access points.
- The Category 5 campuses include:
 - Austin ES, Wright ES, Hall MS, Curtis ES, Tison MS, Martin ES, Crockett ES, Bowie ES, Travis ES
- Category 5e campuses include:
 - WHS, NGC, Seguin ES, Ikard ES
- The DSB facility is the only building currently operating on Category 6 cabling but it also contains a limited amount of Category 3 cabling. Category 3 cabling cannot support data throughput above 10Mbps and is used primarily for older voice systems.
- The fiber backbone used between the MDF and IDF rooms is a 6-strand 62.5/125 multi-mode fiber backbone capable of supporting up to 1000Mbps. However, the majority of the MDF to IDF room backbone connections in the WISD campuses are made of a 1000 Mbps copper connection using 5e cable. The only campuses using fiber between the MDF and IDF rooms are:
 - WHS, NGC, Seguin ES and Ikard ES

Cabling Administration

- The District does not have a cable labeling standard in place. The technology department does not have any record drawings (AKA close outs or as builts) that can be used to identify the cabling drop locations or telecom room locations.

Classroom Technology

- Some of the components used today in the classrooms regardless of grade level include:
 - Phone
 - Teacher computer – each teacher is assigned one laptop.
 - Projector
 - Two or more student workstations
- According to the technology department no campus meets this standard in all of its classrooms. Multiple manufacturers have been used as some of the older equipment died off. This requires the District to maintain different models and makes managing the systems more difficult than a campus that has the same level of

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manufacturer and capability.

- There is no video distribution system used in the campuses.

Recommendations for Consideration:

1. Upgrade the cabling in all campuses with Category 5 cable to Category 6. Consider reducing hard drop counts in classrooms in favor of a more robust wireless network.
2. Upgrade the cable pathways in buildings that do not meet the WISD standards by adding J-hooks, or other industry approved pathway materials.
3. Upgrade or add new fiber backbone between the MDF and all IDF rooms or IDF Portables. Fiber backbone should be capable of supporting 10Gbps transmissions and can either consist of 50/125 Multi-mode fiber or single mode fiber.
4. Upgrade all switch gear incapable of delivering Power over Ethernet (PoE) for the new wireless standards or that is no longer supported by warranty or has exceeded end of life.
5. Begin migration or upgrade to the new 802.11ac wireless standard. Any cabling supporting new wireless locations should consists of a minimum Category 6 standard and be equipped with two data drops per device location.
6. Add new UPS devices to protect switches and other equipment in the IDF rooms.
7. Upgrade or replace old UPS systems that no longer provide protection from power surges or failures, have exceeded warranty or are no longer supported by the manufacturer.
8. Establish classroom technology standards and upgrade or replace outdated equipment as needed.
9. Add bonding and grounding to all MDF and IDF rooms.
10. Add dedicated HVAC to MDF and IDF rooms that do not have it.
11. Upgrade and expand the electrical power needed to support the growth and use of classroom technology in all grade levels. Upgrade or grow the use of classroom technology to establish a level or parity at the grade levels.
12. Establish a WISD standard on labeling all outlets at the faceplate, behind the faceplate and behind the patch panels with machine generated labels. Add labels to the ceiling grids to identify any drop locations supporting wireless access points or surveillance cameras.
13. Consider upgrading or adding convenience power in areas where mobile technology, BYOD or other wireless devices may need to be charged.