Fort Bend Independent School District

Technology Master Plan Proposal

As of June 02, 2014 – Infrastructure Only

INTRODUCTION AND BACKGROUND

Fort Bend ISD (FBISD) has witnessed a tremendous increase in the use of technology across its environment over the past decade. Technology fills every aspect of our academic and operational environments. Technology can simplify collaboration and communication, empower daily lives, add value to the student experience, and inspire creativity in teaching and learning. In addition, in order for FBISD to realize its mission and vision to our students, these new and increasingly complex technology infrastructures need to be current and reliable for optimal use.

Technologies, while always the "tools" and not the "ends in themselves," can and will play key roles in the learning environment. The Technology Infrastructure Master Plan is designed to ensure that information technology priorities and initiatives are targeted to support FBISD's mission and vision. Prioritization and coordination of technology planning and implementation will ensure that FBISD students, teachers, and staff have the combination of skills, knowledge, and technology to succeed in a technology-rich future. A comprehensive and active master plan that focuses on human and financial resources will create the necessary technology infrastructure that provides a technological environment to help "to inspire and equip all students to pursue futures beyond what they can imagine."

The Technology Infrastructure Master Plan addresses the current state of technology in the District, provides background information and observations, lists the recommendations based on the work of the FBISD Information Technology Department, the FBISD Technology Steering Committee, Education Partners Solution, Inc., and GoIT; and specifies next steps in the District's Technology Infrastructure planning process.

This plan is developed with the intent to build technology infrastructure to support education, which includes more than simply providing computers and software. Best practices and industry standards will lay the foundation of this infrastructure plan; however, student, staff, and community engagement are critical to the development and implementation of the final Technology Infrastructure Master Plan. A third party technology consulting firm will be engaged to assist in evaluating the findings to help develop the best technology infrastructure options for FBISD.

This plan is a working document that will be revised and updated each year. It is flexible with specificity to serve as a guide in decision-making and budgeting. The recommendations contained in this master plan are intended to provide direction for the Board of Trustees, the Superintendent and his Executive Team, principals, teachers, support staff, parents, and students in planning for technology initiatives for the foreseeable future.

ASSESSMENTS

Two comprehensive needs assessments, an infrastructure assessment and a classroom technologies inventory, were conducted to analyze the current status of technology in the District and determine future needs. Items analyzed include, but are not limited to: infrastructure, hardware, software, and classroom technologies. The third parties conducting the comprehensive needs assessments include:

1. Education Partners Solution, Inc., (EPS) conducted the infrastructure assessment
2. GoIT performed the classroom technologies inventory

The following are summaries of the reports submitted by EPS and GoIT. Additional needs that were not included in the scope of work for EPS and GoIT were included to provide a holistic view of the current state of technology within FBISD.

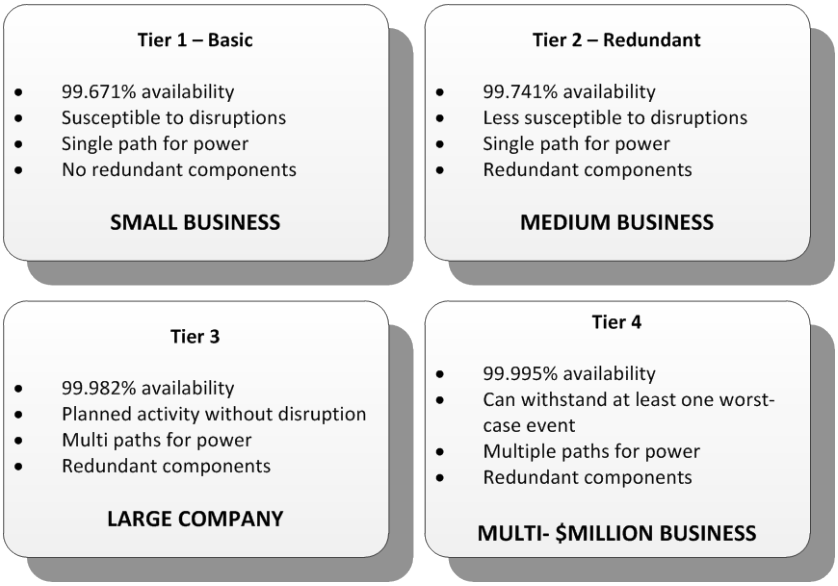
I. INFRASTRUCTURE ASSESSMENT

Data Center

The District has a single data center located in the Administration Building. The data center is made up of the physical facilities, electrical power, uninterrupted power supplies (UPS), generator, air conditioning, and security to support the District's comprehensive information and telecommunication systems. The data center serves as the core of the District's data and voice network, servers, data storage, applications, and Internet for all student and business data and voice services.

The data center was renovated in 2011; however, the EPS report points out that FBISD's data center is limited to elements of a Tier 1 data center. (See Figure 1)

Figure 1: TIA-942 Telecommunications Infrastructure Standard for Data Centers



FBISD's current data center cannot provide mission critical services required to provide reliable, sustainable data and voice needs of the District. The assessment indicates the data center has many single points of failure with no disaster recovery and/or business continuity plan. A disastrous event could cause an extended outage that will adversely affect FBISD's student and business data and voice services. The assessment recommends improvement to the data center infrastructure to increase the level to at least a Tier II which will increase reliability and availability of the data center and its mission critical services.

Server Environment

The physical and virtual server environment provides the computation horsepower to run critical applications such as the District's email system, SharePoint, PeopleSoft, storage, SQL database environments, Kronos, web services, etc. The assessment indicates close to 50 percent of the physical servers are older than five years with 34 physical servers continuing to run on the Windows 2003 operating system, which is no longer supported by Microsoft and 56 physical servers running on the Windows 2008 operating system. This leaves the applications running on these servers exposed to vulnerabilities and system outages. The applications that run on these outdated servers include FBISD's email system, SharePoint collaboration system, and web services. Both physical and virtual server environments should be redesigned and upgraded to provide the required reliability and capacity needed to support the District.

Storage Area Network
The storage area network (SAN) environment stores data, provides storage for backup, and supports the virtual server environment. The SAN hardware is aging with 40 percent of the storage environment running on hardware that is seven years old. The SAN is approximately 88 percent filled, leaving the SAN inadequate to support the current storage needs and future initiatives such as Safe and Secure School's IP camera project as well as Human Resources and Business and Finance's paperless environment. In addition, the SAN operating system is several revisions behind leaving the environment vulnerable to software faults and exposed digital weaknesses. The backup solution for the data on the SAN is neither robust nor reliable. The SAN needs to be redesigned and expanded for current and future storage needs.

Data Network
The data network consists of the wide-area network, the local-area network, and the wireless local-area network. These networks provide the core transport mechanisms for the data and voice traffic from one campus to another campus, to the data center, and/or to the Internet.

1. Wide Area Network
FBISD's wide area network (WAN) provides data and voice connectivity between the District's worksites to the data center. The WAN consists of a one gigabit per second (Gbps)[1], fiber optics network from each campus to the data center. Twenty nine schools have dual fiber connectivity to the data center, providing the needed redundancy; however, 60 percent of the District still has a single connection leaving 44 campuses and other District's worksites with a single-point-of failure. Should the WAN network link become inactive, the campuses will not have data or voice services. The assessment recommends a secondary link for each site in order to achieve true network redundancy. Additionally, the WAN links need to be upgraded to higher bandwidth (up to 10 Gbps) for future traffic such as wireless and video feeds from Safe and Secure School's IP camera project.

2. Local Area Network
FBISD's local area network (LAN) provides wired data and voice network connectivity to the classroom. FBISD has a high percentage of network equipment (77 percent) that is at or near the "end of life" mark where the manufacturer does not make the equipment anymore. A significant percentage (46 percent) of the network equipment is either at "end of support" or will be at "end of support" within the next three years where the manufacturer will no longer provide support to the equipment.

Another important component of the LAN infrastructure is structured cabling. While most of the cabling is supporting one Gbps to the desktop, the main connections need to be redesigned to10 Gbps to allow increased traffic such as wireless and video. The equipment closets that house the network equipment and cabling do not have backup power or air conditioning. If local electrical power to the equipment closet is lost, the data and voice network equipment will go down, resulting in no data or voice services to the classrooms or offices. The immediate concentration needs to be on upgrading the "end of life" and "end of support" equipment. The District's strategy is to provide reliable computing and voice services at the campuses. Providing generator power and relocating some of the equipment closets to a better environment will be explored.

3. Wireless Local Area Network
FBISD's wireless local area network (WLAN) provides wireless connectivity to mobile devices. While the wireless core at the data center is effectively designed with current equipment, the

[1] Gigabits per second (Gbps) is a data transfer speed measurement for high-speed networks.

campus WLANs are not standardized and do not have current wireless technology. In order for the wireless devices to get access to the network, a wireless access point (WAP) is needed. Education Partners Solution, Inc., uses the number of WAPs installed at each school as a measurement of the availability of wireless local-area network at the particular campus. The results of EPS' findings are as follows:

- Elementary Campus
  41.3% (19/46) had 10 or less WAPs (underserved)
  39.1% (18/46) had 30 or more WAPs (adequate)

- Middle School Campus
  66.7% (10/15) had 20 or less WAPs (underserved)
  26.7% (4/15) had 70 or more WAPs (adequate)

- High School Campus
  50.0% (7/14) had 20 or less WAPs (underserved)
  28.6% (4/14) had 75 or more WAPs (adequate)

Upgrading and expanding the WLAN to a standard ubiquitous access wireless network in all campuses is a priority to support mobile learning and other wireless initiatives. The report further recommends that consideration should be given to provide outdoor wireless coverage to support student access, instructions, and any future Safe and Secure Schools initiatives.

Access Management
Access into the FBISD network uses a standard industry authentication process and hardware. This system is integrated into Microsoft Active Directory and provides the basic login access for District devices and applications. The access is not standardized across all applications and devices, leaving users with multiple login processes and procedures. With the advent of a widely deployed WLAN, more mobile devices will be able to login to the network. The ability to integrate and provide a comprehensive identity along with access and a security platform should be evaluated for both the network and applications.

Management Tools
FBISD lacks the essential network and server monitoring tools to provide proactive problem resolution and preventive maintenance. Network monitoring tools use server-based system to constantly monitor a computer network for slow or failing components. This system checks components including server-based application, email or web servers, other computing systems and the health of the network itself. These tools are necessary to return network and application services quickly. Management systems will need to be included in IT toolset.

Internet
Internet access is a critical resource for 24/7 learning and access to digital educational resources for both students and staff. Internet service is critical for a robust Disaster Recovery and Business Continuity strategy and also a critical component in leveraging advances in cloud and managed services. The current two Gbps Internet access bandwidth is at 75 percent capacity. The adoption of "bring your own device" (BYOD) or any other classroom computing device initiative will exacerbate the current Internet congestion and cause exponential demands on the FBISD Internet service. The Internet infrastructure should be upgraded to handle up to 10 Gbps.

Phone Systems
The existing voice network is a Cisco voice over Internet Protocol (IP) network. The voice service is provided over the fiber optics connection from the District's worksite to the data center. When the fiber link is not available, the voice service is not available to the campus. The campus staff has to resort to the use of cell phones or analog telephone lines from Windstream. The voice equipment is more than five years old and needs to be upgraded. About 7000 of the telephone sets will no longer be supported by the manufacturer in 2015. The voice infrastructure (including providing the necessary redundant WAN link) to each campus should be upgraded to ensure reliable phone services.

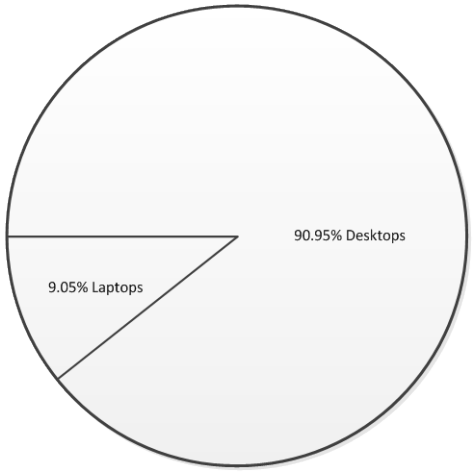
Data Warehouse
FBISD has many disparate sources of data, ranging from student data to human capital resource data and more. Many of the data sources are parsed into different data sets that feed into different systems. For example, student data, student achievement data, human resources data, financial data, asset tracking, special education, food services, and professional development feed into different reporting systems. Integrating data from one or more disparate sources creates a central repository of data, a data warehouse. The data warehouse houses all data in one place where it is easy to find and generate required reports. A data warehouse is needed to ensure the accuracy of FBISD generated reports.

II. CLASSROOM DEVICE INVENTORY

FBISD believes it is essential for teachers to integrate technology to improve teaching and learning in the classroom. Technology is a useful tool to develop literacy, teach problem solving skills, and facilitate critical thinking. Technology is used by teachers to inform and support the delivery of instruction, to manage classroom records, to assess and monitor student achievement, and to communicate with students, staff, and parents. Teachers use computers or laptops with projection systems to deliver lessons, to access online resources, to assess student learning, and to motivate and engage students. In the classroom, teachers and students use technology as a tool to help acquire, valuate, present and distribute information. Teachers and students are involved in project-based learning in student-centered environments.
Some of the uses of document cameras include instructional presentations or for students to share their writing, drawings, and other assignments with the entire class. These resources enable students to engage in learning while also providing teachers various methods for bringing lessons to life.

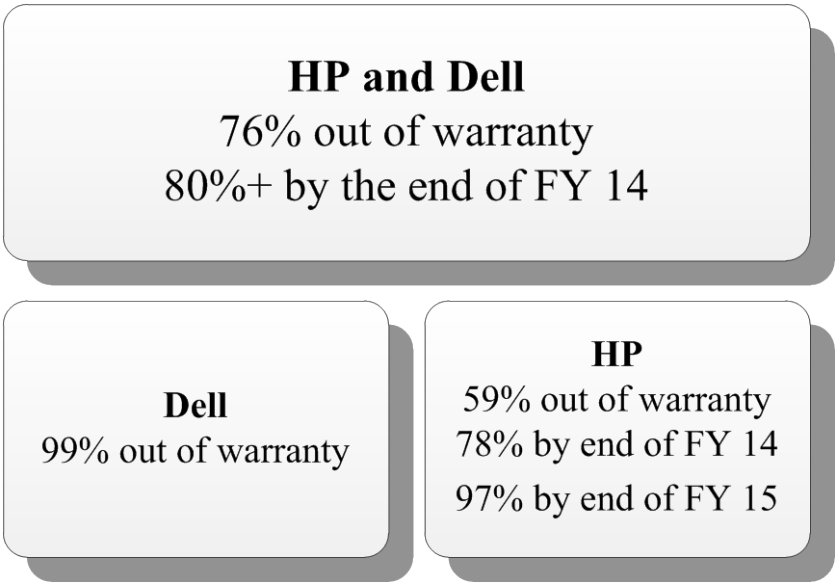
Figure Two shows the current computer inventory as completed by GoIT. Currently there are 31,360 desktop computers in the District and 3,120 laptops.

Figure 2: Computers by Device Type



FBISD computers are mostly Hewlett Packard (HP) with a few Dell and other brands in the inventory. Ninety-nine percent of the District owned Dell computers are out of warranty. Fifty-nine percent of the HP computers are out of warranty, seventy-eight percent of HP computers will be out of warranty by the end of 2014, and ninety-seven percent of the remaining HP computers will be out of warranty by the end of 2015. (See Figure 3)

Figure 3: Computer Warranty



Life cycle information of computer devices by model is not available from the manufacturers; however, more than 99 percent of Dell computers and more than 24 percent of HP computers were purchased over five years ago. More than 60 percent of HP machines were purchased over three years ago and by the end of 2014, the number of HP machines that were purchased over three years will reach over 85 percent.

Generally speaking, any computer that is older than five years is difficult to support, especially when the warranty has expired. Furthermore, upgrades to productivity software such as Microsoft Office, modernization of other applications, and operating system (OS) changes often require hardware refreshes to keep up with the increased memory and faster processor demands. In the last 3 years, two new versions of Microsoft OS have become the standard for desktops and laptops and Microsoft Office 2013 has become the prevailing productivity software version. Optimal experiences for both applications require considerable more memory and processing speed. Table One lists the number of computers that are currently considered outdated.

Table 1: Device ages

4+ years old computers	5+ years old computers	6+ years old computers	7+ years old computers	8+ years old computers
23,488	19,885	12,241	7,504	5,913
68%	58%	36%	22%	17%

All FBISD teachers currently have one computer dedicated for attendance, grading, and professional use. The District has 5,600 projectors and 4,116 document cameras dedicated to both classrooms and

computer labs. (See Table 2) To have one project for every classroom, all but three elementary schools will need additional projectors. The schools that have adequate projectors are Setters Way Elementary, Sugar Mill Elementary, and Heritage Rose Elementary. Approximately 50 percent of middle school classrooms have adequate number of projectors. Forty-five percent of all high school classrooms have adequate number of projectors. Finally, there are only 1,212 interactive whiteboards throughout the District.

Table 2: Device inventory

Device Type	Count
Desktop	31,360
Laptop	3,120
Document Camera	4,116
Projector	5,600
Smart Board	1,212
Tablet	9,606
Clicker	16,985
Video Camera	59
Total	**72,058**

As a minimum standard in FBISD, all classrooms need an up-to-date dedicated computer and an instructional presentation station consisting of a projector and a document camera for each classroom, along with a computer lab for use in curricular presentations. As needed, individual schools will purchase interactive whiteboards and will likely use mobile whiteboard technology as an alternative to one permanently mounted in the classroom.

INFRASTRUCTURE LIFE CYCLE MANAGEMENT

FBISD will develop a life cycle management program to ensure the District's network equipment and servers are up-to-date. Servers and network equipment are generally on a five to seven year replacement cycle with additional servers and network equipment being purchased as the need arises. Core network infrastructure will be on a five to seven year replacement cycle.

FBISD will develop a life cycle management program for computing devices to ensure the District's computing devices remain consistent with current technology. All computers will be on a five-year replacement cycle with funding earmarked each year to replace one-fifth of the computers.

TECHNOLOGY STEERING COMMITTEE

A Technology Steering Committee consisting of parents, teachers, representatives from every District division, campus administrators, and District's information technology leaders, was formed to include a wide range of expertise, knowledge and experiences surrounding technology. This committee met several times over the course of the 2013-14 school year. Time was spent learning about the current state of technology in our District, what technologies are being used around the world in the field of education, and what technologies are being used in the private sector. The Steering Committee reviewed technologies used in the public and private sector and discussed how these technologies might be adapted by FBISD to improve student learning. Committee members' input was shared during each meeting through large and small group discussion. Table Three lists the members of the Technology Steering Committee.

Table 3: Members of the Technical Steering Committee

Members	Department	Division/ School
Terry Miller	Community	Community
Asha Vaidya	Community	Community
Allan Bassham	Facilities	Operations
Sarah Togle	Human Resources	Human Resources
Sheron Blaylock	Human Resources	Human Resources
Lynnette Myer	Digital Learning	Curriculum and Instructions
Meredith Watassek	Career Technical Education	Curriculum and Instructions
Thomas Negri	Assessment	Curriculum and Instructions
Stacy Crews	Community Relations	Community Relations
Kelly Schlacks	Business & Finance	Business & Finance
Sonja Curtis	Business & Finance	Business & Finance
David Yaffie (Chair)	High School Principal	Clements HS
Thomas (David) Graham	Middle School Principal	Crockett MS
Latecha Bogle	Elementary Principal	Highlands ES
William Jeffery (Vice Chair)	High School Teacher	Bush HS
Walter Benavides	Middle School Teacher	McAuliffe MS
Shelly Puckett	Elementary Librarian	Meadows ES
Jojo Jacob	Information Technology Services	Information Technology
Mitzi Patin	Business Information Systems	Information Technology
Lisa Mirza	Student Information Systems	Information Technology
Long Pham	Chief Information Officer	Information Technology

TECHNOLOGY EVALUATION

The FBISD Information Technology Department will continually evaluate hardware and software to provide students and teachers with tools that can enhance the learning process and improve student achievement. To ensure the educational success of all students through the use of a technology rich learning environment that will prepare students for the future, it is vital to monitor and evaluate the plan to assess growth and progress. Stakeholders' involvement and feedback is vital in this process to promote student achievement. The changing staff requirements and future technology innovation both need to be incorporated to be able to change, update, and enhance the plan to better implement the use of technology

in assisting students to meet curriculum standards and to assist staff in delivering instruction and services to students and parents. Throughout the evaluation process, benchmarks and timelines may need to be adjusted to more efficiently discern what steps need to be taken, by whom, and when.

TECHNOLOGY INFRASTRUCTURE ASSESSMENTS

A Technology Infrastructure Audit will be completed and reported to the Board of Trustees once every four years. The comprehensive audit will provide a report including the status of classroom devices, information security, and technology infrastructure assessments. These assessments will be necessary to ensure FBISD's technology infrastructure is still viable to support then current technology requirements and needs.

COMMUNITY ENGAGEMENT

During the upcoming school year, the Community will be invited to participate in the Technology Strategic Plan for the classroom. Community engagement is an essential part of planning and developing effective technology strategy. The engagement process will serve as the District model for reviewing best practices in classroom technology to ensure maximum awareness and input from the public prior to changing and implementing new classroom technologies. The process may also be used where applicable to develop actions in support of the District Strategic Plan Goals and Objectives and to modify the Technology Infrastructure Master Plan as needed.

Community engagement is critical to the success of the planning process. To ensure the highest level of participation, information about the process and community meetings will be sent via School Messenger and through District and campus-based communication methods. Additionally, the District will provide information about meetings and explain how to participate virtually in the process to the news media, via the District's website, and through multiple email distribution lists.

Revised June 4, 2014 5:05 p.m.