Benjamin Franklin Classical Charter Public Network Walkthrough

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Course 954 - Fall 2013

School Profile

The Benjamin Franklin Classical Charter Public School ("BFCCPS") is located at 201 Main Street in the heart of Franklin, Massachusetts, just outside of both Boston and Providence, Rhode Island.

BFCCPS currently enrolls 448 kindergarten through eighth grade students from Franklin as well as over ten surrounding cities and towns. BFCCPS is staffed with over 60-faculty comprising of lead teachers, aides, content specialists, student support along with an administration and central office team.

Building Background

At the present, BFCCPS is leasing the former St. Mary's Catholic School in Franklin, Massachusetts, situated across the street from the Parish of St. Mary Catholic Church. The current owner of the building is the Roman Catholic Archdiocese of Boston, which has entered into a mutual 1-year, renewable lease with BFCCPS. With enrollment at capacity, lack of an operational kitchen or working gymnasium and a need for many repairs throughout the building, BFCCPS has submitted an official amendment to the school's charter with the Massachusetts Department of Secondary and Elementary Education ("DESE"), allowing for the doubling of enrollment to 900-students, which, if approved, will force BFCCPS to change its existing location to accommodate additional students. The charter amendment is also a request to regionalize, which may require BFCCPS move out of Franklin and into a nearby town.

As of February, 2014, BFCCPS will be informed by the DESE if the charter amendment was approved, which will set off a domino effect of major discussions on financing the costs associated with the purchase of a new building or the costs associated with retrofitting an existing building. If the charter is declined by the DESE, a complete revamp of the current building with a new, long-term lease will be required.

Networking History

Constructed around 1920, the building layout and construction materials presented numerous networking challenges for BFCCPS in the past and in the present.

While the school was increasing enrollment in the late 1990's, BFCCPS added a modular structure, which included office space for administration and three classrooms. The modular unit was a temporary solution and has reached its limited life expectancy. Electrical issues are still a concern, causing occasional glitches to the copiers, printers and computers being used in this area.

Cat 5 cabling was installed in late 1990's with a pair of network drops in each classroom. Rather quickly, the amount of computers and printers outnumbered the drops. External switches were placed in classrooms that needed additional access, with poor results. Often, electrical circuits would fail because of the extra technology required a heavier electrical load. Also adding to confusion, when Cat 5 cables were retrofitted, locations were not mapped correctly or detailed inside the server closet and at the drop. With none of the original cabling labeled, this remains a current issue.

More recently, in July, 2011, high performance 802.11n Aerohive wireless access points were installed along with updated Cat 5e cabling. The cables were routed brought back to the server closet and were

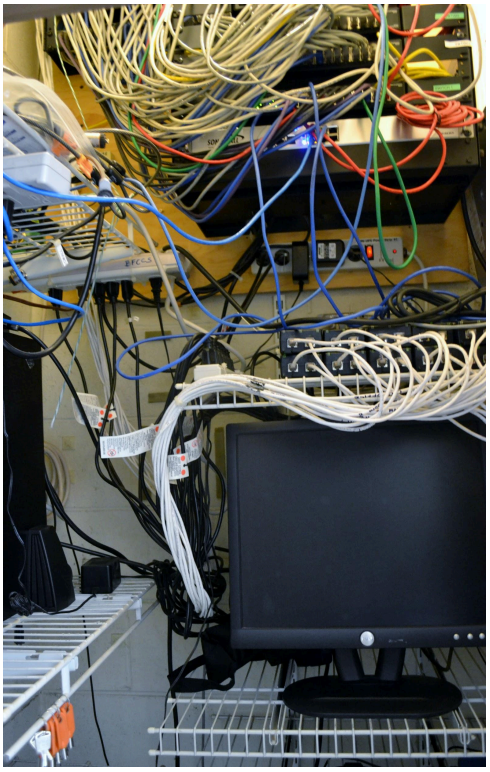
connected to a brand new Cisco 10/100/1000 gigabit switch. However, there are older Cisco 10/100 switches that need replacement and are currently a lynchpin for slower speeds on the network. These older switches need to be replaced and are apart of future technology improvement considerations. *(Pictured right, an Aerohive Wireless Access Point)*

With a dozen Aerohive wireless access points located throughout, including modular locations, wireless signal is relatively strong and covers roughly 98% of the building. Thick concrete walls along with some unique architecture do limit the full strength of the wireless signal in certain locations, however even with degradation, signal remains strong enough to participate in the upcoming Partnership for Assessment of Readiness for College and Careers ("PARCC") online field tests as well as having hundreds of devices connected during peak times maintaining solid speeds.

Presently, the BFCCPS network is 50-Mbps download and 10-Mbps upload when connected directly to the cable modem. However, download and upload speeds are reduced because of wireless signal strength and overall network limitations, including older wiring and switches. Wired users at BFCCPS experience typical download speeds in excess of 35-Mbps, with wireless users in excess of 25-Mbps.

Network Overview: Local Server

In 2008, BFCCPS purchased a Dell PowerEdge 2900 for standard networking duties along with a Dell PowerEdge 1600SC server, which doubled as both an email server for First Class and was a web host for the school's web page at bfccps.org. In short, both servers were running Windows Server 2003 with improper settings and lacked any real documentation, causing wide reaching issues, which continuously arose and caused a great deal of anguish for all technology users at BFCCPS.



During the summer of 2011, along with the creation of a technology director position, BFCCPS targeted technology enhancements for faculty and students. BFCCPS switched to Google Apps for Education for email access, which allowed for the retirement of the Dell PowerEdge 1600SC email server and also forced the switch to Network Solutions, to host the school's website. Working with Google has allowed for a better, more easily managed email environment, along with tools such as Google Drive and Google Docs.

Relating to bfccps.org, which received a recent redesign and a better web hosting solution, the site provides a point of pride for the school, a central source for parent communications and showcases BFCCPS students to the local community. *(Pictured left, the server closet at BFCCPS)*

In 2012, the last remaining server was updated to Windows Server 2008 software and completely rebuilt, which greatly improved the functionality for everyday networking tasks. With cloud based products and solutions coming down the road, the Dell PowerEdge 2900 is really only responsible for two major processes. First, issuing over 1000-IP addresses using a super scope for users to access network resources and the Internet via Dynamic Host Configuration Protocol (DHCP). Second, maintaining the Active Directory (AD) database for user domain access for Dell workstation access.

As software and products are updated, BFCCPS is consciously making an effort to use cloud based services. The process of moving away from a local server to a cloud based solution has been slow, however after exploring the purchase of a new server, and the next step is clear; a new local server will not be purchased when the old server fails. Also in 2012, an off-site backup with installed using AmeriVault Backup. The automatic backup takes place at selected intervals of time, removing the need to manually plug in local storage for important backups.

Some ideas that will allow BFCCPS to move forward without a local server are increasing faculty Google Drive storage, shifting the BFCCPS Student Information System (SIS) to a cloud based option (which is available through our current vendor) and using cloud based storage and backup solution for the financial software. Also being discussed, at the end of their useful life, BFCCPS will replace teacher Dell laptops with a Google Chromebook.

The long term viability of the network resides almost solely with the decision by the DESE on the BFCCPS charter amendment. With a new charter and building, BFCCPS will be able to tailor a network environment from the ground up by retrofitting an existing, modern structure or better yet, starting fresh by building a new school. BFCCPS' technology and networking is in a holding pattern until further notice.

Network Overview: Security Solutions

To adhere to both state and federal laws, BFCCPS incorporates a Sonic Firewall, which is a web content filter, provides gateway antivirus protection along with intrusion prevention from outside threats.

At the computer level, all Dell laptops, netbooks and desktops are using Microsoft Security Essentials for anti-virus software. Devices like Apple iPads and Google Chromebooks aren't equipped with anti-virus capabilities and while on the network, would rely on local settings and the Sonic Firewall for protection.

Networking Overview: Printing Services

With over a dozen Hewlett Packard, Kyocera, Xerox printers and two Xerox all-in-one's, faculty have access to a wide range of devices to complete their school projects. During the 2012-2013 school year, BFCCPS printed an amazing 1,250,000 copies (7,000 copies per school day!). Although the the school has the capacity to print and scan like a full print shop, there is a significant desire to reduce network bandwidth and the amount of printing taking place each day. *(Pictured right, one of two Xerox copiers at BFCCPS)*

At this time, students do not have access to printing, however because of the strength of the existing Google Apps for Education program, fifth through eighth grade students do have the ability to share or "turn in" assignments digitally through using their school issued Google Apps for Education accounts.

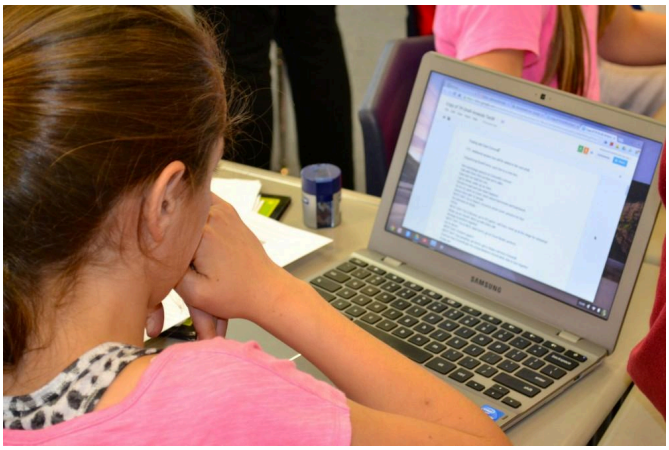
Accessing the Network: Students

Over the course of a school year, the Dell PowerEdge 2900 server supports roughly 10 GB in local student data. Many projects that include video and photos are stored locally, until they are ready to be published or submitted for grading. All students use a generic login to access Dell workstations and the student file sharing folder. Various folders and projects reside in this one file sharing folder, where kindergartners and eighth graders alike can access their data. Student access is occurs in sandbox environment, separate from faculty data and shares.

Typically, kindergarten and first graders have only a handful of projects each year during specific technology class, using Dell laptops. With this group, they access and use many apps on the iPad and maintain a blogging account through kidblog.org during class times.

Where most server use can be seen is with second through fourth graders, who have access to Dell netbooks in their classroom. To maintain a sense of order, students save work to the server and not locally on any machines or on local desktops. With the guidance of the technology department, teachers are looking into alternatives to working with locally saved files and are also making a push to kidblog.org accounts. A goal of the technology department is to lower the Google Apps for Education program down to the second grade.

Fifth through eighth grade students work with their school-issued, web-based Google Apps for Education account, providing access to document creation, collaboration and file storage in the cloud, as well as one-way e-mail access with BFCCPS faculty, facilitating communication and collaborative learning. The typical BFCCPS middle school student will find that they use their Google Apps for Education account, an estimated 95% of the time. Most students never save anything to the student server file share unless they are taking a technology related class, which requires students to be record and/or edit video. *(Pictured left, a student working on a Google Chromebook)*



Per the BFCCPS AUP, students access the internet and other technology resources under direct supervision. Students are not responsible for typing in any passwords for wifi and only need to remember either their own Google Apps for Education account or for younger students, the generic login credentials.

Accessing the Network: Faculty

Every faculty member has the ability to use a BFCCPS issued Dell laptop or in some instances, a Dell desktop. There are multiple teachers with access with two machines. All faculty laptops are capable of connecting to the (23) Epson LCD projectors throughout the building. Having easy access to the network, with as few restrictions as possible, along with quality hardware and support from the technology director, allows for a greater impact on student learning and achievement. As a whole, faculty enjoy a "get out of the way" approach with the BFCCPS network and are appreciative of the tools made available inside the classroom and software to maintain strong connections with the parent community.

For faculty who are more comfortable with their own device, teachers are allowed to connect to the wifi network. About 15% use personal devices on the BFCCPS network.

Every faculty member is given the ability to login to a Dell laptop or desktop and connect to the server using their own Active Directory credentials. Various file sharing folders are made available, depending on user needs. Much of what is stored on the local server has been replaced by Google Drive.

Also, faculty have the ability to store data to their own folder on the server, which is securely backed up off site. At this time, although there might be changes for some individuals who have large amounts of data, there aren't any limitations on the amount of data that can be stored on the server.

Accessing the Network: Parents/Guests

For those wishing to connect to the network, who are not faculty or a student, BFCCPS does allow guest access, after accepting a "terms of agreement", which appears upon connecting each time to the Internet. Guest access doesn't allow access to local resources to the server, preventing access to file shares or printing.

Classroom Configurations

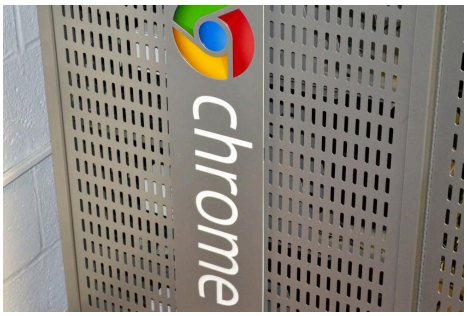
If students are to succeed as 21st Century learners, they must be technologically literate and have regular access to up to date technology that supports their learning. BFCCPS technology approach is guided by the general ideas:

1. Students need access to technology integrated with the current proven curriculum
2. Teachers need appropriate tools to efficiently use technology to impact learning
3. To be successful, students need access to a variety of technology environments

A key point relating to classroom configurations is the technology available to a student in one particular grade is consistent, however, as a student graduates to the next grade level, they are introduced to a variety of devices.

The device model for the student population is broken down, in general, over the following groupings:

- iPads: Kindergarten classes have access to a classroom set of (6) Apple iPads running iOS 6. First grade classes have access to a classroom set of (9) Apple iPads running iOS 6. Powerful built-in apps and a collection of hand-selected apps by faculty allow students to engage with content in interactive ways. (30-iPads total)



- Dell Netbooks: Second through fourth grade classrooms, which is a total of six classes, have access to a pair of media carts, each with (27) Dell Netbooks running Windows 7. (54-netbooks total)

- Google Chromebooks: Fifth through eighth grade classes have access to a grade level cart of (25) Google Chromebooks running Chrome OS. Also a cart of (25) Google Chromebooks is available for additional coverage. (130-Chromebooks total) *(Pictured right, the outside of a Google Chromebook cart)*

- Dell Laptops: All students have a weekly technology infused class in the library lab with access to (26) Dell laptops running Windows 7. Also a cart of (13) Dell laptops running Windows XP is available for the Fine Arts Department to use along with locally saved music software. (39-Dell laptops total)

As of this report, (October, 2013) the BFCCPS inventory has a total of 337-computers, capable of connecting to the internet, of which 258 are associated, exclusively, for student use.