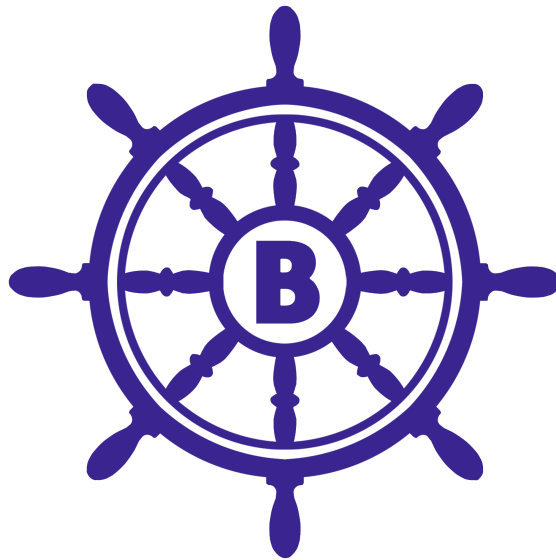


Bourne Public Schools
District Technology Strategic Plan
2022-2025



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Introduction

The Bourne Public Schools consist of four physical school buildings and one central office building. Bourne Intermediate School, Bourne Middle School, and Bourne High School are all located on the same campus. These three schools along with the central office are located on the Cape Cod side of the bridge, with Bournedale Elementary School located on the mainland side on its own campus. The 2021-2022 student enrollment as of October 1, 2021 is 1,557.

Upon meetings with district stakeholders and building walks, it is clear the district has invested time, effort, and money into technology; however, the district has been without a Director of Technology for approximately 10 years. The staff who were interviewed expressed a strong desire to make instructional technology a priority, but stated there has been no clear guidance or communication on how to accomplish this. The COVID-19 Pandemic has only added to the demand and challenge to provide exemplary technology services across the district. This strategic plan will attempt to address the technology needs of the district. It will provide background knowledge on the current technology in place, and provide a goal of where the Bourne Public Schools would like to be in three years. The plan will look at: ***physical infrastructure, end user devices, operating systems, classroom technology, applications and software, staffing, policies & procedures, and security (Appendix B)***. In addition, the formation of this plan will include recommendations from staff surveys, feedback from technology committee meetings, and advice from 3rd party technology vendors.

Physical Infrastructure

Cabling, Firewalls, Fiber Circuits

Each of the four Bourne school buildings and central office have a local area network connected at 10gbs between IDF closets and switch stacks which is considered industry standard. The three schools located on the main campus (Bourne High School, Bourne Middle School, and Bourne Intermediate School) are all interconnected on a wide area network by single-mode fiber at a rate of 10gbps. The central office is also connected to the wide area network by single-mode fiber at a rate of 10gbps. The fiber optic wide area network that connects these three schools and central office are all privately owned by the Bourne Public Schools and utilizes Extreme Switches which are redundant. The fiber switches are in pairs at each building providing redundancy. The connection between the Bourne Middle School data center and the Bournedale Elementary School on the mainland is connected by a leased 100mbps fiber optic circuit owned and operated by Open Cape LLC. The Head-End or data center for the Bourne Public Schools is located at the Bourne Middle School.

Our primary Internet circuit is a 1gbps single mode fiber optic circuit owned and operated by Open Cape LLC. Upon reviewing Internet aggregate bandwidth reports in early December, it appears the school district is utilizing about 550-650 mb/s of bandwidth during peak operating hours. During standardized testing and other times of high utilization, bandwidth usage is expected to increase to the 700mbps - 800mbps range. Based on these data sets, upgrading our Internet Circuit is something that should be evaluated at the end of each school year. In addition, our current Internet circuit does not have dDos mitigation services on it. Not having mitigation services on our circuit only puts us at risk of a Denial-of-Service attack

in the future. These types of attacks are debilitating to our operations and would cause large-scale Internet failure in the district. In addition the inability for the district to effectively operate and educate our students would be compromised. Several Massachusetts school districts in the past two years have been hit with dDos attacks and cannot recover from them without some type of mitigation service in place. It would be the recommendation of the technology director that dDos mitigation services be purchased and placed on our Internet circuit by Open Cape. In addition to the dDos mitigation and looking into the future, it would be a good I.T. practice to secure an additional ISP as a backup to Open Cape. In the event our circuit goes down related to weather, mechanical, or a pole strike an additional Internet pipeline at reduced speeds would at least allow us to stay operational as a district.

The current Internet circuit enters into our data center at Bourne Middle School and terminates at a Ciena box. It then enters a Palo Alto firewall and an Ad-Tran SIP appliance for VOIP services. The Palo Alto is approximately 7-8 years old and is not set up with another (HA) high availability unit for redundancy. The annual recurring costs are approximately 12k for the services on the Palo Alto. It would be the recommendation of the technology director to replace the unit with a pair of redundant (HA) firewalls with a lower annual recurring cost. This purchase would be e-rateable as a category 2 project.

Another area to be considered for upgrade which would be very manageable, is increasing our bandwidth on our leased transit circuit from Bourne Middle School to Bournedale Elementary School. It is currently at 100mbps and pricing has been received to triple it to 300mbps. Since our phone circuits run on this line in addition to data, the increased bandwidth would help with call quality and speed up data transit.

Wireless Access Points / Wi-Fi Coverage

The four schools as well as the district office all have Extreme Wireless Access Points installed, with a few exceptions. While Extreme WAPs are universal across the district, there are a variety of models and due to the limited number of WAPS they do not provide 100% coverage across the district. Many are not ceiling mounted, but rather plugged into a wall jack sitting on a counter or table. In addition most of them are connected via Cat 5e and not Cat 6 or Cat 6a which would provide for faster speeds with the newer model WAP's. For some dead zones, residential Wi-Fi routers have also been utilized and will need to be replaced. A Wi-Fi audit and heat map should be performed over the summer of 2022 of all buildings. This is in order to plan for WAP upgrades and to confirm proper placement of WAPS. The audit will also look at installing new cabling to deliver the fastest speeds possible. It would be the hope of the technology director to put out an RFP with an E-rate Form 470 in the winter of 2023 in order to secure E-Rate funds for any type of Wi-Fi and cabling upgrade projects.

Data Center at Bourne Middle School

Our data center closet is located in the Media Center at Bourne Middle School. There are several racks of switches, patch panels, servers, and other appliances. The room is climate controlled by a mini-split AC system. In addition the room has six rack mounted Uninterrupted Power Supplies that provide emergency power in the event of an outage until the generator is providing power. In order to provide more robust and clean power, the technology director is recommending a 3 phase hardwired Uninterrupted Power Supply in the future.

In addition to the cooling and power, the room should be cleaned and free from as much dust as possible to secure longevity on the equipment. The servers and storage are HP units

and are approximately 10 years old. There are two physical servers and four (12) bay SAN's attached that are all routed through redundant fiber switches. VMware is running on the servers which in turn give us the ability to operate approximately 14 virtual servers. Some virtual machines are not needed anymore or are still running the end-of-life operating system Windows Server 2008. It would certainly be the recommendation of the director of technology to upgrade the physical server infrastructure sooner rather than later. The current server infrastructure is running on borrowed time at this point. Once again, this data center serves the entire district including the central office. It would be the recommendation of the technology director to replace the current architecture with similar HPE next generation Proliant Servers and a 16gb Fiber Channel Storage solution.

For a backup solution the district is running Veeam on a Dell EMC Data Domain. It is the understanding of the Director of Technology that this solution also serves as a replication point for the Town of Bourne's data center. Unfortunately, there is no documentation of the backup architecture and the town is currently operating without an I.T. department. Our Veeam support and license is also expired. Due to the unknown status of our backups, a new Datto backup appliance with cloud replication has already been purchased and is online. Once the Town of Bourne engages a new I.T. manager, dialogue will take place to discuss future interoperability plans.

One final recommendation would be to confirm all network I.T. closets are air conditioned, and are in working order. Having climate controlled closets will extend the longevity of the equipment in the closets and prevent them from overheating during hot, humid days.

End User Devices, Operating Systems, and Classroom Tech

Desktop Devices

The Bourne Public Schools utilizes a variety of manufacturers of desktop pc's that have the Windows operating system on them. All office and teacher workstations universally utilize this setup. The concern is that most workstations are 6-8 years old and still have Windows 7 on them. Windows 7 is end-of-life and not receiving security patches. A plan has already been executed to begin replacing these devices with the Windows 10 operating system on them. Once all devices are updated over the next two years, a replacement cycle will be implemented.

Chromebook Devices

Similarly to desktops, the district has a variety of Chromebook manufacturers in use across the district. The district has made it a point to go one-to-one with Chromebooks with the COVID-19 Pandemic playing a huge role in it. Students in grades K-5 are assigned a Chromebook for use in school, with the expectation that we can pivot to remote learning quickly. These devices can also be brought home if the family requests them. Students in grades 6-12 are assigned a device to be taken home each night and used for classwork.

Upon reviewing the Google Administrative Console, it appears there are approximately 1028 devices that will be auto-expiring over the summer of 2022, with some of those being Chromebases that are no longer needed due to the 1-1 Chromebook program. The Director of Technology will be looking to replace approximately 750 of those devices using Emergency Connectivity Funding provided by the FCC. The replacement cost is 100% covered up to \$400/device. This will ensure we have a fleet of Chromebooks that are operable for years to come. In addition to the student Chromebooks we are attempting to get replaced through the

ECF fund, we are also putting in for 200 staff Chromebooks which are desperately needed in order for staff to be fully digitally involved with their students.

Apple Computer and IOS Devices

While the district has very few if any Apple computers in use across the buildings, the Director of Technology will be looking to purchase a classroom set of iMacs to run Adobe Creative Suite at Bourne High School. There are currently old Windows PC's running it and they are having a hard time with the demand placed on the processor and memory. A new set of high-end iMacs have been written into a grant already.

The district has about 100 iPads in use that I have come across. The Student Services Department also just purchased another 54 to be used for testing purposes. Before the technology department rolled them out, we researched and tested mobile device management software in order to track and manage them easier. Once the new devices are rolled out, we will begin taking the old ones back and installing the software onto them in order to manage them as well.

Classroom Technology

Each of the four schools in the district is somewhat different when it comes to the type of technology in place in the classrooms. Starting with Bournedale, the classrooms have mostly Infocus projectors, with SMART Boards. In touring the facility, attention was brought to many of the projectors that are starting to fade or the clarity is no longer there. While some may just be the result of an old bulb, some are certainly the electronics going in the projector. It would be the recommendation of the Director of Technology to add Bournedale to a replacement

cycle in the next two years. Bourne Intermediate School, which is the newest building, has New Line Panels installed along with Hover Cam Pilots in each classroom. While there are some isolated classrooms with issues, overall Bourne Intermediate School is in good shape. Bourne Middle School also has all new New Line Panels installed along with Hover Cam Pilots. In this situation, this replacement project was funded by a Town Meeting Article recently and many of the Pilots have failed and the technology department had spent a considerable amount of time diagnosing and repairing them. Bourne High School has a mix of new panels and old projectors. The spring 2022 town meeting approved a \$206,000 capital article on the warrant for completely replacing the projectors at BHS for interactive panels. This project will take place over the summer of 2022. The main idea with all these projects is to provide consistency across the district to make managing them as well as training on them easier.

Applications, Software, Staffing, Policies & Procedures, and

Security

Applications & Software

The Bourne Public Schools employ a variety of applications and software. Anything from our digital textbooks to our PowerSchool Student Information System, to classroom educational applications fit into this category. An all encompassing list is still being added to, but we have a good handle on what the district employs.

Once again when it comes to applications and software, we would like to try and be as consistent as possible across the district. We are already a Google district utilizing Google Workspace. If there are any other applications that we can utilize cross district we will certainly

take advantage of that opportunity. As for technology department software, we are currently looking into a new, more efficient ticketing and asset management system, as well as other products that allow us to push out new software remotely and monitor the network at a more granular level.

Staffing and Policies & Procedures

The Bourne Public Schools employs a full year Director of Technology, a full year Network Systems Specialist, a full year Administrative Assistant for Data Services and a school year Technology Educational Support Professional. These four individuals make up the technology department. During the past five months, the Director of Technology has had the opportunity to speak with and understand the roles of the three staff in his department. Considering there were just two staff who were the only individuals responsible for maintaining all the technology across the district up until September of 2021, they did and continue to do an exceptional job. Moving forward, the Director of Technology will continue to work together with his staff to streamline and upgrade technology, and ensure that data across the district has integrity. There will certainly be possibilities to streamline our data processing throughout the many systems in use. In speaking with the Technology Committee and reviewing staff feedback from the technology survey, concerns have been raised about the limited number of technology staff and the ability to not only address technology issues but assist classroom teachers with technology integration. A number of district staff have stated they would be more willing to integrate technology and take chances with more technology tools in their lessons; however, a lack of technology staff and technology professional development hampers their ability to. It should be noted there are 4 stipends being paid to one staff person in each building to act as a

point person for technology related issues in their building. In the 2022/2023 school year, more Technology Meetings will need to be centered around how to best utilize these positions and if we should consider moving in a different direction.

Finally, policies and procedures that include the Acceptable Use Policy, A Social Media Policy, as well as procedures around using technology equipment will need to be reviewed during the 2022/2023 school year. These two subjects will certainly help to provide more direction and clarity once reviewed, updated, and brought to the attention of not only technology department staff, but the entire district in general. Since sanctioned district social media is considered public record, it does fall under M.G.L. public records laws and should be backed up as such. A solution will be looked into in the next 18-24 months.

In closing Appendix A will help to explain current technology use in the classroom, as well as provide a high level overview of how important staff feel technology is in their day-to-day operations of their classrooms. There is much work to be done, and it is important to remember this is not a sprint to the finish line, but rather a marathon that will take several years to bring us into a good spot.

Action Steps FY2023

1. Purchase DDOS (Distributed Denial of Service) mitigation on Open Cape Internet Circuit Proactive Protection against cyber attacks.

\$5,100 Not Eratable

2. Increase transport circuit from 100MB to 300MB from Bourne Middle School Data Center to Bournedale Elementary. Improve speed and reliability for VOIP phones.

\$3,240 - 60% Erate reimbursement

3. Replace 8 Year Old Single Palo Alto Firewall with recurring annual costs of approximately \$11,000 with a new high availability pair of Fortigate Firewalls. Annual recurring cost of Fortigate is approximately \$3,000

\$32,460 - 60% Erate Reimbursement = \$12,984 Cost to Own (\$19,476 savings)

4. Replacement of Bourne High School Projectors with Interactive Panels

\$206,000 Funded by Town Meeting Article

5. Replacement of Data Center Servers, Storage Appliances, and Switches

\$115,000 Funded by Operating Budget

6. Purchase of 745 student Chromebooks and 200 staff Chromebooks

\$374,148.80 If approved with Emergency Connectivity Funding

7. Conduct network security audit after installation of firewalls and servers

\$10,000 Funded by Operating Budget

Action Steps FY2024

1. Conduct heat map and audit of all school buildings wireless access to determine plan to upgrade access points and cabling
\$250,000 - 60% Category 2 Erate
2. Replace all Bournedale Elementary School Projectors and Smart Boards with Interactive Panels
\$200,000 - Town Meeting Capital Article
3. Replacement of analog CCTV cameras across all buildings with digital CCTV
\$50,000 - Operating Budget or Capital Article / Ongoing for next 3 years
4. Migration of Windows servers to the latest version
\$30,000 - Operating Budget
5. Upgrade of staff desktop computers in classrooms and offices (Ongoing)
\$25,000 - Operating Budget
6. Design and engineer plan for centralized access control and CCTV system across all buildings. This would bring RFID FOB access to perimeter and interior doors as well as centralized management. To be procured in FY25

Action Steps FY2025

1. Install fob readers and electronic strikes at BMS, BHS, and Central. Install new centralized server.
\$225,000 - Town Meeting Capital Article
2. Continued replacement of analog CCTV cameras across all buildings with digital CCTV
\$50,000 - Operating Budget or Capital Article / Ongoing for next 2 years

3. Upgrade of staff desktop computers in classrooms and offices (Ongoing)

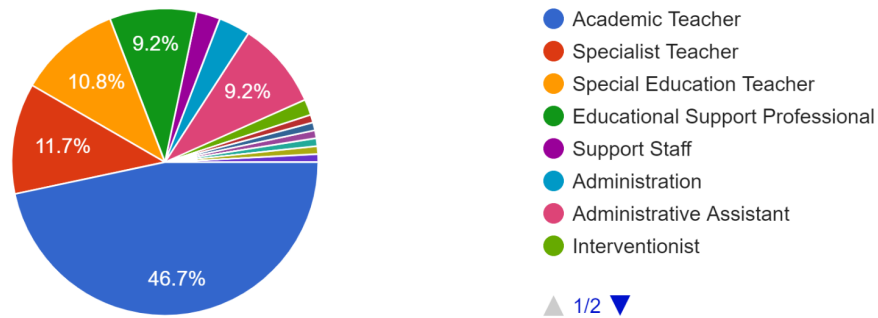
\$25,000 - Operating Budget

Appendix A

Staff Technology Survey Results

What best describes your position?

120 responses



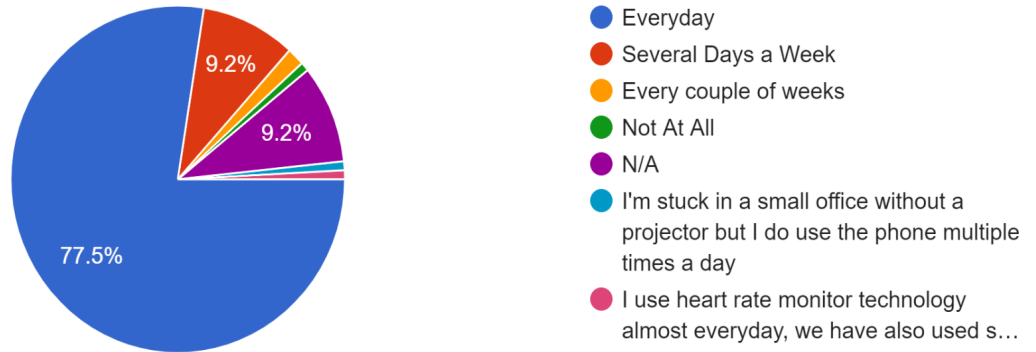
How important is technology to you in your current role?

120 responses

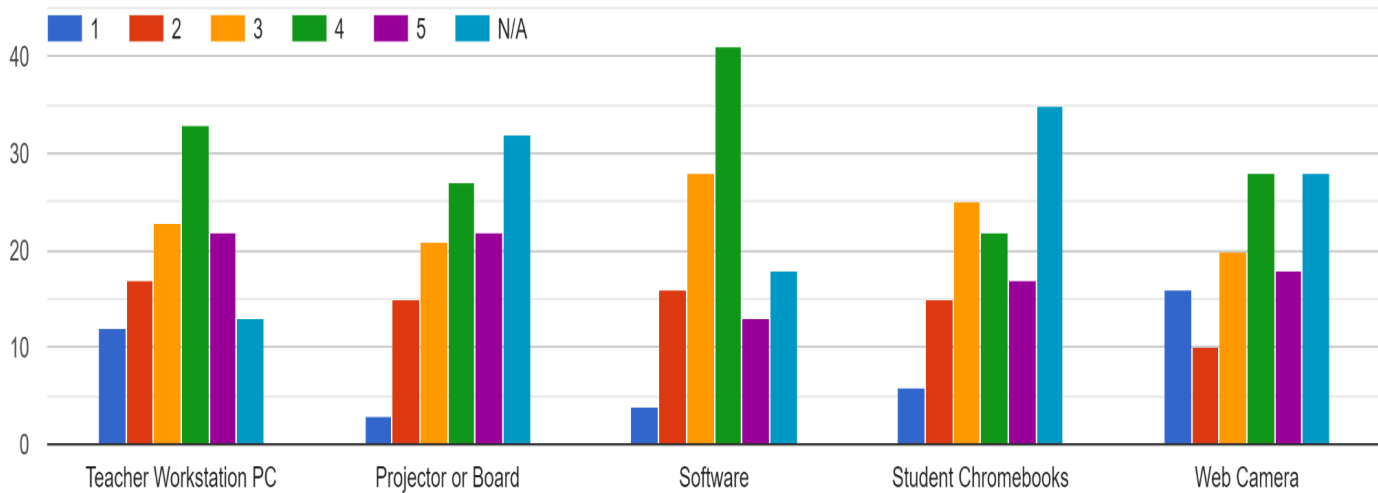


How often is technology used in your classroom?

120 responses



Please rate the following technology in your classroom / office



1 = Very dissatisfied 5 = Very satisfied

Do you feel your technology ticket requests and work orders are addressed in a timely manner?

117 responses

