

VI. Information Technology Evaluation

As with most School Districts, plans for technology within Warwick Public Schools have been based upon the educational technology needs of each School within the district. With the new mandates from Federal and State governments, the district has had to develop new plans for technology to support the demands for data and assessment. The Warwick Public Schools is striving to provide the school district with the tools necessary to deliver the highest level of instruction to their students to prepare them for the workplace, and at the same time, gather the data required by the Federal and State Government for assessment needs. In order for students to be properly prepared to compete in an ever-increasing technological world, all students must possess adequate knowledge, skills and competencies. The School District must provide Educators with the tools needed to integrate technology into the curriculum to improve student achievement, and at the same time, implement an infrastructure to support the new mandates and requirements from the government.

With the No Child Left Behind Act (NCLB), Education needs to focus on high standards, accountability, and school improvement. By 2008, the Rhode Island Regents' Regulations mandates that all students will be required to demonstrate proficiency of required knowledge and skills in six core areas (ELA, Math, Science, Social Studies, Arts and Technology) to graduate. Each district is required to establish proficiency-based graduation requirements for all students beginning with the 2008 graduating class.

The school-wide diploma assessments, Graduation Portfolio and Exhibitions, are components of the new High School Diploma System. Graduation Portfolios require students to collect and select evidence that represents work completed to high levels of performance over their high school education. Additionally, the Graduation Portfolio requires students to demonstrate proficiency as measured against GSEs and other state and national standards. Students are also required to include formative reflections for individual entries and summative reflections for the collection of entries in their Graduation Portfolio. In addition, students must participate in a formal presentation of their Graduation Portfolio. The second requirement, Exhibitions, will be met by Senior projects. Senior projects incorporate research, public speaking, community involvement, and a physical project creation. The intent is that the project will reflect the skills and knowledge the student has developed over the past 12 years. As a result, these two requirements rely on technology and the district needs to implement a foundation to support and provide the necessary tools for the students to obtain their proficiency to graduate.

Another key requirement that the School District needs to address is the implementation of Personal Literacy Plans (PLP). As of 2005-2006 all students not reading to their level are required to have a PLP. A PLP is a plan of action for a teacher to use to bring a student to reading proficiency. Districts are required to track and assess a student's PLP process. As a result, Warwick School Department has embarked on implementing an automated module that interfaces with the Student Management System for teachers to update, track, and assess student performance.

With these challenges, the district must develop a plan to meet all requirements and provide the tools necessary to support the students' goals to be successful. The district does have a Technology Plan developed, titled "Focus 2008 Technology Supporting Proficiency." It focuses on the critical requirements the district needs to address around High School Graduation Proficiency, Personal Literacy Plans, and High School Accreditation.

The Warwick School Department is making strides towards meeting the goals of "Focus 2008." The district has begun a project to implement Digital Portfolios starting with the graduating class of 2008. The School Department has also automated the PLP process by adding an online module in the Student Information Management System, called "Star_Portal," for teacher access and updating.

As part of the evaluation of the Information Systems, funding resources used for technology, policies and procedures supporting technology, hardware and software, staffing, and support were reviewed. This document outlines recommendations for improvement and includes an environmental scan of the Information Systems implemented in the district.

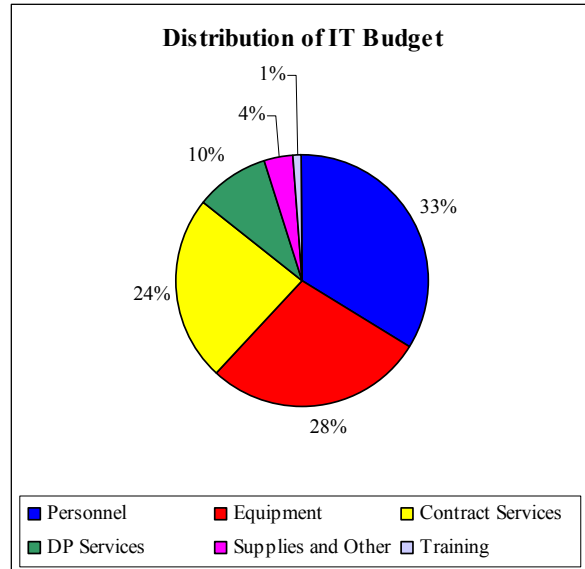
Budget

Funding for technology in the Warwick School Department comes from a variety of resources, including grants, the District Technology operating budget, Title IID funds and Erate funding from the Federal Government. The district applies for grants to off-set the cost of several initiatives. As detailed later in the Environmental Scan, the district has several projects in process that were initially funded by grants, such as Emergency Calling, Laptop carts at Gorton, the Digital Portfolio project, and others.

The yearly technology operating budget, funded through the local budget, approximately \$1.9 million, is the main resource for funding technology for the schools. The operating budget is outlined below.

Estimated IT Budget - FY 2006		
Expenditure	Amount	Share
Personnel	\$646,209	33.9%
Equipment	532,840	27.9%
Contract Services	452,600	23.7%
DP Services	184,500	9.7%
Supplies and Other	71,470	3.7%
Training	20,600	1.1%
Total IT Budget	<u>\$1,908,219</u>	
Source: Based on School District Data		

As illustrated in the pie chart, one-third of the operating budget is for personnel costs of the IT Department, and one-third of the operating budget is used for new equipment purchases such as Servers, Switches, and some computers. Twenty-five percent of the budget is used for Maintenance contracts to support the district, as detailed in the Environmental Scan later in the document. Please note that this does not reflect additional technology purchases made by the individual schools. Each school has an equipment budget that is utilized for computer and peripheral purchases.



Another area of funding that the district has taken advantage of is the reimbursements for telecommunications services through the Erate program offered by the FCC School and Libraries Division. Based upon free and reduced lunch counts, a district may apply for reimbursements for monies spent on telecommunications, Internet Access, and Internal Connections. Last funding year, July 1, 2004 through June 30, 2005, the district was awarded a \$75,000 reimbursement against the cost of the telecommunications costs. Application is a yearly process and there is no guarantee that a district will be funded. The School District has been fortunate to receive reimbursements in the past five years out of eight years the program has been in place, for a total of approximately \$375,000 in Erate funding to date for Telecommunications Services only.

Staffing

With the need and use for technology in a district, many different people are involved. Technology in education is used by Administration, Teachers, Students, and Staff. Each group has their own requirements and, therefore, uses technology in different ways.

The IT Staff of the Warwick School Department is tasked with the maintenance and support of the technology in place, as well as ensuring that future technology needs are met. The IT Staff that supports the Information Technology Systems in the district consists of the Manager of Information Systems, the Assistant Information Services Manager, (5) Technicians, (1) Systems Analyst and (3) Data Specialists.

The world has become technologically dependent. As a result, education needs to provide the tools necessary for teachers to instruct and students to learn. The IT Staff is in a position to provide them and support them, but the question arises, “Are these tools being used as they were intended? If not, why?”

The following highlights and recommendations are based on the findings developed in the Environment Scan. There are some areas where further efficiencies may exist, but overall, with the initiatives in place and the requirements for High School Graduation Proficiency, reporting and assessment, and provision of the tools needed for the students to learn, funding is limited and may not be sufficient for the district to reach its goals:

1. *Evaluate the potential for establishing a unified IT function with the City and the School Department.*

There are several areas of consolidation that may improve efficiency for a City and School Department the size of Warwick. The City and the School Department should consider combining resources and evaluate what areas could be consolidated and what the return on investment would be. With similar initiatives planned by both entities, a unified plan may drive down costs and provide the City and School Department with a more efficient, cost-effective and robust IT infrastructure that neither entity could afford individually.

The City and the School Department may increase productivity and efficiency by integrating resources. Although the technology usage is different for each entity, there are fundamental technologies that are similar, such as networking, Server Operating System support, and Desktop support. By integrating some of the tasks of the teams, the City and the School Department may utilize additional resources to increase support time and may reduce out-source maintenance contracts.

As noted in the report, there are several areas where consolidation of resources, services, and projects may improve efficiency and reduce the overall costs to the City and School Department. The next step in the process should be to jointly (City and School Department) contract with an outside firm to conduct a detailed analysis of the Information Technology Systems at both the City and the School Department to evaluate, at a minimum, all hardware and applications in use, staffing, support procedures and contracts, and future initiatives. A detailed unified plan should be assembled and become a blue print for future purchasing and planning.

2. *Explore the feasibility of moving toward a unified Financial Management Information System (FMIS) for the City and the School Department.*

The City and the School Department may save costs by centralizing some services and streamlining some of the processes in place. The School Department is supporting Pentamation for a financial application and the City is utilizing MUNIS. The School District is paying upwards of \$56,000 for upgrades and maintenance of the current system. The City is paying similar costs for the upgrades and maintenance to their Financial Application. There is data that needs to be transferred between the School Department and the City, but because of disparate systems, data entry from the School Department is a manual process into MUNIS. Not only is the overall City-wide budget paying approximately \$75,000-\$100,000 to maintain two financial systems, but the process to transfer data from one to another is costing the City money in additional staffing. The

School Department's Administration is planning to replace the financial system (Pentamation), in approximately 24 months. Evaluation of products will be performed over the course of the next 12 months and purchase and implementation will take place the year after. This would be the opportunity for the two entities to explore the feasibility and return on investment by moving toward a unified system.

3. *Explore the feasibility of consolidating licensing purchases with the School Department and the City to minimize costs.*

Since the City and the School Department operate many of the same licenses, such as Microsoft Windows Client Licenses, Microsoft Office Licenses, and Anti-Virus licenses, the option to consolidate licensing contracts should be explored.

4. *Explore the feasibility of integrating the Wide-Area Network and IP Telephony initiatives.*

The City and School Department can save money long-term by combining the two WAN networks. It is understood that a plan was in place to run fiber-optic cabling throughout the City to interconnect all buildings with a fast pipe. If the City interconnects to the School Administration Building, services could be centralized and efficiencies could be realized. First, the City would be able to take advantage of the Disaster Recovery solution the School District has in place and leverage each other's services.

Also, the cost of Internet Access may be reduced by consolidating. Another area is an initiative that both the City and the school department have explored - upgrading the existing voice system to IP Telephony. By implementing IP Telephony city-wide, all entities may reduce the overall recurring costs of telecommunications by leveraging each others resources. The total number of Telco lines would be reduced, the number of PBX systems would be reduced, and overall maintenance should decrease.

5. *The School Department should make immediate accommodations for students to access computer resources outside of assigned times within the school day.*

During this evaluation, it became apparent that the tools that the City and School Department have invested in are not being used to their potential. For example, the district has invested in many computer labs district-wide for the students and teachers to use for research and curriculum development.

According to Warwick School Department personnel, there are staffing issues that result in students being unable to use the Computer Labs to work on their projects or papers except on scheduled days for their class. For example, if a student needs to do research on a project for his/her History class, the student can only use the Lab during the time that the History class is scheduled for usage of the Lab. The district is being challenged with the requirements for High School Proficiency, but the students cannot use the tools already in place after class or at the end of the day because there is no one to staff the Labs.

6. *The School Department should provide a status report by October 1, 2006 on the issues and recommendations detailed in this document to the City.*

The School Department should report to the School Committee and the City Council the status of the issues and recommendations for future planning and funding purposes to aid the School Department in achieving their required goals.

Policies and Procedures:

To maintain an effective Information Technology System, many policies and procedures need to be in place to provide for efficiency, cost-effectiveness, and accessibility. Without them, the system may become inefficient and potentially chaotic. With a district the size of Warwick, it is important to institute and maintain policies and procedures to provide a technology environment that effectively supports its teachers, students, and staff, as well as, the tax payers. Warwick School Department does have a series of policies and procedures in place. The policies and procedures are posted on the website, www.warwickschools.org, and are referenced in the Technology Plan. The policies and procedures in place include:

- *Telecommunications Policy:* outlines rights of students and teachers to access computing resources in the Warwick School Department and their individual responsibilities as users.
- *Acceptable Use Policy for Internet Access:* outlines the rules for user access of the Internet
- *Network Guidelines:* includes policies and procedures around hardware and peripheral usage, software installation, donations, policy for email, web page development procedures and overview of content filtering.

There are opportunities to enhance some of the School District's policies to ensure the system can operate in an effective and safe manner:

1. *Strengthen and maintain inventory reporting and documentation to ensure accurate records. A comprehensive inventory should be in place by October 1, 2006.*

The district should strengthen its policy and procedure on maintaining up-to-date documentation and inventory of all IT assets. Although the Warwick School Department does have some documentation of the system, it is not complete and needs to be updated and maintained. Given the fluid nature of technology, it is necessary to maintain an inventory for depreciation purposes alone. It is important for planning and asset recording purposes that this documentation is available and accurate. It is difficult to know what is needed to support students and teachers if one does not know what is currently available.

The School Department should evaluate the tools used by the City for inventory management and determine the feasibility of incorporating the School Department's inventory with the City to take advantage of existing technology and management practices. Therefore, a complete inventory of all servers, desktops, laptops, switches, routers, printers, and peripherals, including

configuration, serial number, location, and any contract needs to be developed by October 1, 2006.

2. *Develop and maintain a tracking system by October 1, 2006 for management and support of all technology in the district.*

Once the product or service is procured, a process needs to be put into place to access the IT personnel for technology assistance. Presently, the procedure is based on a work order process through Exchange. If a teacher or staff member needs a technician, a request is submitted via Email. The requests are assigned to a technician. Once the Technician completes the request, a report is sent to the Manager of Information Systems to review.

Presently, there is no tracking system in place to track the length of time it takes to close out a request, how many times the same request has been made, or if a computer has suffered from the same problem a multiple number of times. The district should consider investing in a tracking system that will make the process more efficient. A tracking system would show how long it takes to respond and resolve an issue. It would track issues by type, so the district could quickly determine if there is a hardware/software problem or if more training is needed. The School Department should evaluate the tools used by the City for tracking support requests to take advantage of existing technology and management practices.

Also, the system would be able to track whether multiple systems are having similar problems which may indicate that the manufacturer may need to get involved because it is a bigger problem than originally thought. This is a key management tool that the district should invest in to increase efficiency.

3. *Update the district's Technology Plan with new initiatives and a district-wide plan including educational technology.*

A district Technology Plan becomes the key document for planning purposes for initiatives and projects. The plan should include all uses for technology, projects, project timelines, and sources of funding. Several different entities, including State and Federal Government, look to the document for information regarding the plans for technology within a district. The Technology Plan should be continuously updated with the new initiatives of the district, plans for Internal Connections as it relates to the Erate program offered by the FCC School and Libraries Division, and incorporate a district-wide plan for technology, as it relates to all academic needs of the district for proper planning and funding.

4. *Develop and continuously update a yearly all funds technology budget.*

In order to properly plan for technology, funding resources are needed. The district should develop an all fund Technology budget that incorporates all funding resources utilized and available to the district. Also, any movement of money from one account to another must be documented.

5. *Evaluate the status of access to technology in each school to determine the degree of uniformity among the different school levels.*

The equity of technology in the schools requires attention. Currently, the Administrators at each school, with recommendations and requests from teachers, request the technology for their buildings. Technology usage in each school is different. There does not appear to be an equitable distribution of technology among the schools. The Technology Plan calls for one computer for every three students. Clearly, based upon the table, the School District has not reached its goal. The district needs to incorporate into the Technology Plan, a deployment and funding strategy to reach its goal and keep it updated.

The Elementary Schools do appear to be more standardized than the High Schools and Junior High Schools. Assuming a district-wide curriculum plan is in place, technology and how it is applied would be similar among the High Schools and Junior High Schools. For example, Warwick Vets and Pilgrim High Schools have more computers per pupil and Computer Labs than Toll Gate High School. As a result, some students in the district are not exposed to and do not benefit from the same technology tools as other students in the district. The question arises as to whether that effects the overall learning experience of each pupil. Hopefully, with the new Technology Application Assessment Coordinator on staff, there may be some guidance and uniformity with technology tools throughout the district.

The average number of computers in an Elementary School is 65 with a computer-to-student ratio of 1:4.53. The average number of computers in the Junior High level is 124 with a computer-to-student ratio of 1:5.25. The High School level averages 324 computers with a computer-to-student ratio of 1:3.98.

6. *Ensure product and services procurement continues to adhere to current bid law.*
To begin with, as with all public entities, it is a requirement for the district to adhere to current bid law. Procurements for technology must follow a defined process. Any requests over \$2,500, but less than \$5,000, must be accompanied by three current quotes and requires approval from the Superintendent. Any requests over \$5,000, but less than \$10,000, also require three current quotes and need to be approved by the School Committee. Anything over \$10,000 must be put to bid and follow bid law. The district does leverage State Contracts wherever possible to minimize the cost of the bidding process. It is imperative that the district continue to follow the procurement process and bid law for all purchases.

**Warwick School Department
Student-Computer Ratios**

School	Personal Computers	Student Enrollment	Student - Computer Ratio (1)	Percent of Peer (2)
<u>Elementary Schools</u>				
Cedar Hill	104	394	3.79	83.7%
Drumrock	49	318	6.49	143.3%
Francis	60	263	4.38	96.8%
Greene	57	259	4.54	100.4%
Greenwood	65	301	4.63	102.3%
Holden	51	270	5.29	116.9%
Holliman	66	321	4.86	107.4%
Hoxsie	51	351	6.88	152.0%
Lippitt	81	312	3.85	85.1%
Norwood	64	226	3.53	78.0%
Oakland Beach Park	85	408	4.80	106.0%
Park	65	234	3.60	79.5%
Potowomut	49	156	3.18	70.3%
Rhodes	77	306	3.97	87.8%
Robertson	62	239	3.85	85.1%
Scott	63	271	4.30	95.0%
Sherman	82	367	4.48	98.8%
Warwick Neck	71	288	4.06	89.6%
Wickes	56	315	5.63	124.2%
Wyman	42	287	6.83	150.9%
<i>Sub total</i>	<i>1,300</i>	<i>5,886</i>	<i>4.53</i>	
<u>Junior High Schools</u>				
Aldrich	150	656	4.37	83.3%
Gorton	118	634	5.37	102.3%
Winman	104	664	6.38	121.5%
<i>Sub total</i>	<i>372</i>	<i>1,954</i>	<i>5.25</i>	
<u>High Schools</u>				
Pilgrim	367	1,385	3.77	94.8%
Toll Gate	243	1,236	5.09	127.8%
Veterans	362	1,249	3.45	86.7%
<i>Sub total</i>	<i>972</i>	<i>3,870</i>	<i>3.98</i>	
Total School	2,644	11,710	4.43	
<u>Other</u>				
Admin	203			
Career Center	153			
Sub total	356			
Total	3,000			

Notes:

(1) - Students divided by computers

(2) - School Ratio divided by ratio of its schools within the same category (elementary schools, junior high schools, or high schools).

Source: RIPEC Calculations based on Warwick School Department Data (2005)

Hardware and Software:

Requirements for Technology for a school district are significant and can be costly. Designing solutions to support present needs and future requirements for a district with multiple objectives is difficult. With the mandates for accountability from the Federal Government and the necessity for student learning, districts need to find creative ways to implement technology solutions for both needs within the constraints of a limited budget. The Warwick School Department is implementing several technology initiatives that will be beneficial to the long-term requirements of the district:

1. *Complete the Disaster Recovery Plan by August 31, 2007.*

To begin with, the district is ahead of many others with plans for Disaster Recovery. As detailed later in the Environmental Scan of this document, the district has implemented an EMC Clariion CX300 for Disaster Recovery. This project is divided into 2 phases. Phase 1 of this project, which required approximately \$152,000 and is complete, was to configure backup to disk of all the Servers in the Computer Center. It uses Legato Replistor for replication of data to disk. Data is replicated every 30 minutes. Phase 2 of the project is to incorporate the remote servers from the schools in the district. The cost to complete this project is estimated at \$22,700. Since the remote servers are currently not backed up, the district should continue with its plan and complete its project.

2. *Complete the WAN Upgrade by August 31, 2006.*

Another initiative that the district is in the process of implementing is an upgrade to the Wide-Area Network. As noted, all schools are connected to a frame cloud via a T1 connection (1.54Mb). A frame cloud is a termination point of multiple frame relay telecommunication lines to a single point. From the frame cloud, Administration has a T3 connection, which is the equivalent of (24) T1 connections. With the growth of online resources, the need for Student Portfolios, accountability and reporting, access to centralized resources is increasing. As a result, the bandwidth between schools is saturated and needs to be increased.

The Warwick School Department has been working with RINET and Verizon to increase the bandwidth from each school to 10Mb. This new design will provide more capacity for the schools and will support the need for centralized services. The district has already purchased new routers for all schools with the exception of six. The district will need to invest in the six new routers at the edge to support the faster bandwidth. This will cost approximately \$30,000. The plan is to upgrade all locations in 2006. Funding is available in the 2006 budget. Plans for the WAN upgrade should be integrated into the Technology Plan to support the district-wide plan for technology.

3. *Begin the pilot of Online Grading by the 3rd Quarter of the 2006 School Year.*
Currently, grading by teachers in the Warwick School Department is a manual process. Grades are documented and submitted to designated Staff in each school for online entry into Star Base. A group of teachers from Aldrich and Pilgrim will be entering data into the Grading module as a pilot during the 3rd quarter of the 2006 school year. Overall participation and acceptance from all of the teachers in the district is uncertain given the lack of a contract. If accepted, online grading will be phased in by department.

4. *Complete Digital Portfolio Action Plan by November 1, 2007.*
As discussed in the Environmental Scan later in this document, the district has decided to implement a Digital Portfolio Solution as part of the State mandate for Graduation by Proficiency. The district was one of nineteen districts awarded a grant to fund licensing from the State. However, the grant does not include the necessary hardware. A server will be placed in each High School. The servers will be purchased out of Title IID grant monies. Presently, a fee of \$5 per student for access to the system is projected per year. The final cost is not known at this time. In order to meet the 2008 deadline, the district will need to focus on developing and implementing the plan to reach its goal. The district is planning to leverage the SAN (EMC Storage Array Network used for Disaster Recovery) in place to store the data accumulated from the Digital Portfolios for the Senior Class of 2008. Since the long-term goal is to have Digital Portfolios for all students by 2011, the district needs to start planning for the necessary technology now to meet its goal. The district needs to determine what hardware needs to be placed at each school, such as new servers, the associated costs and how to integrate them into a district-wide Technology Plan.

5. *As part of a district-wide Technology Plan, develop a plan to provide all schools with new File Servers to store student data by November 1, 2007.*
One of the needs in the district is to provide secure, networked file storage for all students to save their work, research, and projects. This need goes hand-in-hand with the Digital Portfolio requirements discussed above, but should not be delayed until 2011. Presently, the schools do not have adequate servers in each school to provide student data storage. As a result, the students need to save their work to a floppy or an external USB drive.

There are several ramifications as a result of this process. First, the student data is not being backed up, so if a student loses their media, his/her work is gone. Second, it becomes easy for students to “share” work. There are no security measures in place to prevent this from happening. Storing student data on a central location is needed for several reasons, not only security. First, if the district is going to meet its goal to have Student Digital Portfolios in place, it is necessary for the district to start implementing a plan for this now.

It is understood that the EMC Storage Area Network that is used for Disaster Recovery, as detailed in the Environmental Scan, will be the centralized storage for student portfolios data, but the plan to implement student portfolios for all students is not goalled until 2011. The district should evaluate the requirements for protected student data and develop plans to address the needs now. Students need a place to store their work now. New servers with the appropriate amount of computing power, memory, and disk space to support the student directories for each school. It estimated that such an initiative could require up to \$230,000.

6. *Implement Secondary Domain Controllers for each School by August 31, 2006.*

The other requirement for new servers in the school is for local user authentication services access, and user profiles. As mentioned in the Environmental Scan Overview, the Domain Controllers in the Computer Center at the Administration Building provide authentication, DNS, and DHCP services. If there is a Wide-Area Network failure, PCs that have already obtained an IP Address via DHCP and updated DNS information will be able to continue to function, but will not have access to any applications served from the Computer Center. If a PC has not obtained an IP Address that day, then that computer will not have access to any network services at all.

Also, students do not have individual profiles. For security and user identity needs, user profiles through Active Directory should be implemented. To achieve this, a Secondary Domain Controller needs to be put in each school to take over the basic services, in case of WAN failure. Some of the more powerful servers in the various schools may be retasked and used for this purpose. For the Elementary Schools, the servers do not need to be robust. The Middle Schools and the High school do require more robust servers as Secondary Domain Controllers and may need to be purchased. A complete inventory of the servers in the district, what services and applications they are supporting, and configuration needs to be completed to determine which servers may be retasked and which ones need to be purchased. This needs to be done district-wide and integrated into the Technology Plan. The Warwick School Department has confirmed funding is available in the FY2006 budget for this initiative.

7. *Evaluate the Microsoft School Agreement on a yearly basis to ensure it effectively meets the needs of the district.*

According to the Technology Plan, the Warwick Public Schools has a 3-5 year PC-refresh. There are PCs in the district that are as old as 8 years. Since funds are limited and infrastructure upgrades are necessary, PC refresh becomes more of an obstacle, but is still necessary. The district does attempt to replace PCs when possible and should make this a priority.

In 2001, the Warwick Public Schools invested in a Microsoft School Agreement that provides support and upgrades for the following Microsoft products:

- Operating System
- Office Professional XP
- Visual Studio
- Encarta
- Client Access License for Microsoft Server

The Agreement covers approximately 3,000 licenses. With the plans for the new email system, the district should re-evaluate the cost of their Microsoft Agreement and verify if there is a cost savings with removing the 3,000 Exchange CALs that are no longer needed. The District should re-evaluate the benefits of the School Agreement and determine if it is cost-effective versus purchasing the client licenses outright.

8. *Determine the feasibility of implementing enhanced security at all School levels.*
Another area requiring attention is in the configuration of the networks and the security practices in place. Presently, for login access to the domain at all school levels, there are generic login accounts for student and teacher for all users. With this configuration there is no mechanism in place to determine which user is logged in or track what the person is accessing. With generic logins, students may access other student directories. To enhance login security, user accounts and profiles, through Active Directory, should be implemented at each school. This could be done using existing resources. The latest this should be implemented is with the deployment of Secondary Domain Controllers at each school.

At the network level, the district should consider implementing VLANs (Virtual Local Area Networks) on the LANs in the Junior and High School levels. Presently, the networks in the schools are configured as one large LAN. By breaking up the networks at each school into VLANs, the school may see a performance increase, as well as, provide another level of security on the networks. This security enhancement, if feasible, should be implemented in conjunction with the WAN upgrade and IPT project.

9. *Assess the physical space available in the Computer Center at the Administration Building and determine options for expanding or moving the Data Center.*
The available space in the Computer Center is limited. As the District continues to grow and centralize services, more physical area will be needed. The District should evaluate its options to move the Data Center or expand into another room.

Short-Term Technology Initiatives:

The School District is planning for several projects over the course of the next 12 months:

1. *Once the new Email System is in place, terminate existing contracts associated with Microsoft Exchange and Post Office Mail.*

The District has recently gone out to bid for a new Email and Communication solution to replace Exchange and Post Office. The district has decided to implement a new First Class Email solution starting in the Spring of 2006. As a result, the district should terminate any contracts in place to support Exchange and Post Office.

2. *Incorporate the plan for IP Telephony into the district-wide Technology Plan and evaluate the benefits of integrating the solution with the City for cost-effectiveness.*

The district is currently developing a district-wide IP Telephony solution to replace the existing phone systems. Currently, the district has a contract with Verizon that ended in January and was renewed until January 2007. The district is working with Atrion to develop a design that will replace all analog phones with an IP Phone. The funding for the project, estimated at \$411,000, was originally proposed in the 2006-2007 budget and has since been delayed to 2007-2008. This project will reduce the number of telephone lines needed throughout the district and replace antiquated systems. As the district plans for the WAN upgrade and purchases new switches for the schools, the district should be purchasing equipment that will support the plans for IP Telephony.

3. *Integrate the Emergency Calling Solution with the IP Telephony initiative for interoperability.*

Another technology initiative the School District is working in conjunction with the City is to implement an Emergency Response Center. The City received a grant for \$259,000 to implement a new system. There are six committees evaluating the requirements for the City Entities, Public Schools, and Non-Public Schools in the City of Warwick. The School District is working on the Communications committee to review the needs for communication with the parents in case of an emergency. As the district evaluates the different solutions available with the City, it should take into consideration the integration of the system with the new planned IP Telephony solution.

Information Technology Systems – Environmental Scan

Warwick Public Schools consists of three High Schools, three Junior High Schools, twenty-one Elementary Schools, and one Career Center. A walk-through of the schools, revealed that Technology varies by School. Historically, the administrators at each school, with recommendations and requests from teachers, would request the technology for their buildings. As a result, technology usage in each school is different.

Each School has a Local Area Network that supports 1-2 servers, computers in the classrooms, Computer Labs, and computers in the Library. Each School is connected to the Warwick Public Schools Administration Building via a frame connection.

The Computer Center in the Administration Building houses approximately 16-17 servers that support district applications. For security purposes, the district is broken into three domains, Warwick Schools (Academic), WPS (Administration), and PLP (Personal Literacy Plan). Each school is a child domain. For example, the main domain for the district is warwickschools.org so Tollgate is tollgate.warwickschools.org.

District-wide, the Warwick Public Schools has approximately 3,000 computers, ranging from current to 8 years old. The district purchases Dell computers, as budgets allow. The district is supporting Windows 95 to Windows XP Professional on the desktop.

Network Infrastructure:

From a network infrastructure perspective, all schools are designed and implemented similarly. The networks at each school are comprised of multiple telecommunications closets, interconnected with gigabit backbones. There is a mixture of network equipment including 3COM, Cisco Systems, and Enterasys. At a minimum, desktops have a 10/100 switched connection to the network.

The Warwick Public School Department currently maintains a Wide Area Network that connects all of the schools and administrative offices together. The Schools are interconnected presently via T1 lines into a Frame Cloud. A Frame Cloud is the point where the T1 Telecommunications Lines from each school come to a single point of termination. From the Frame Cloud, there is a T3 that connects to the Administration Building. RINET provides Internet Access to the School District via a 20MB connection from their facility to the Administration Building. The district is protected from the Internet, via a Cisco PIX 525 firewall. To manage bandwidth, the Warwick Public School Department has implemented a Packeteer PacketShaper. To control access to inappropriate Web sites and to adhere to the CIPA law, the district has integrated a Websense content filtering solution.

As noted each School is designed relatively the same, but technology varies. As part of the evaluation, several schools were assessed with more detail. These include the (3) High Schools, (3) Junior High Schools and (3) Elementary Schools, for sampling, as follows:

Pilgrim High School - Pilgrim High School's Local Area Network is comprised of approximately 367 networked computers distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Microsoft Office and is used primarily for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 744 data drops and is distributed among six Telecommunication Closets. The Main Distribution Frame (MDF) supports approximately 336 drops. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the Internet. This closet houses (7) 3COM SuperStack 4400 48-port 10/100 switches to support the end users terminating in this closet and (1) 3COM SuperStack 4900SX 6-port fiber switch used for backbone connectivity to remote closets. Also, a Cisco 2621 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. All equipment is configured for Layer-2 Services, meaning that the network is not providing any additional security beyond what is implemented with Active Directory.

The first Intermediate Distribution Frame (IDF) supports approximately 96 ports. This closet houses (2) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

The second Intermediate Distribution Frame (IDF) supports less than 24 active ports. This closet houses (1) 3COM SuperStack 4400 Switch, 24-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity. Also, this closet houses the Maxtor SAN Device for student data files and (3) Servers.

The third Intermediate Distribution Frame (IDF) supports 96 ports. This closet houses (2) 3COM SuperStack 3300 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity to the rest of the network.

The fourth Intermediate Distribution Frame (IDF) supports approximately 120 ports. This closet houses (3) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity to the rest of the network.

The fifth Intermediate Distribution Frame (IDF) supports approximately 96 active ports. This closet houses (1) 3COM SuperStack 4400 Switch, 48-port 10/100 and (1) 3COM SuperStack 4400 24-port Switch for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

Finally, Pilgrim High School also supports (7) Computer Labs for academic use. The following Computer Labs are used for various subject instruction:

- Room 401: (26) Dell GX150 PCs (approximately 3 years old)
- Room 402: (28) Dell GX150 PCs
- Room 404: (28) Dell GX150 PCs
- Room 407: (28) Dell GX150 PCs
- Room 113: (19) Dell GX270 PCs
- Room 110: (20) Dell GX280 PCs for Computer Class
- Room 614: (28) Dell GX270 PCs (Need to sign-in for Lab use)

Other classrooms have a variety of PCs used for specific applications:

- Room 108: (6) PCs for Art Class (approximately 7 years old)
- Room 104: (4) Dell Dimension PCs for PhotoShop
- Room 704: (4) PCs mixed

The Library has (8) newer workstations in the Back Room Lab dedicated for research only and some word processing. The Library also has another (9) older workstations dispersed in the Media Center used for research only. Pilgrim has video conferencing equipment awarded through a RIDE grant, but is not well-utilized.

Warwick Vets - Warwick Vets High School's Local Area Network is comprised of approximately 362 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Microsoft Office and is used primarily for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 864 data drops and is distributed among seven Telecommunication Closets. The Main Distribution Frame (MDF) is located in the Women's Faculty Bathroom. Approximately, 192 drops are active. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the Internet. This closet houses (4) 3COM SuperStack 3300 48-port 10/100 switches to support the end users terminating in this closet and (1) 3COM SuperStack 4900SX 6-port fiber switch used for backbone connectivity to remote closets. Also, a Cisco 2621 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. All equipment is configured for Layer-2 Services, meaning that the network is not providing any additional security beyond what is implemented with Active Directory.

The first Intermediate Distribution Frame (IDF) is in the Teacher's Room in the Science Wing. Approximately 96 ports are active. This closet houses (2) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

The second Intermediate Distribution Frame (IDF) is in Room CS-1. Approximately 144 ports are active. This closet houses (3) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity. Also, the backbone from the Annex Building terminates in this closet.

The third Intermediate Distribution Frame (IDF) is in the Annex Building. Approximately 24 ports are active. This closet houses (1) 3COM SuperStack 3300 Switch, 24-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to CS-1 for interconnectivity to the rest of the network.

The fourth Intermediate Distribution Frame (IDF) is in the D-Wing Teacher's Room. Approximately 48 ports are active. This closet houses (1) 3COM SuperStack 3300 Switch, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity to the rest of the network.

The fifth Intermediate Distribution Frame (IDF) is in the Book Room in Room D318. Approximately 144 ports are active. This closet houses (3) 3COM SuperStack 3300 Switches, 48-port 10/100 for the end-users. Due to limited capacity, the district will be adding another 3COM Switch to support 48 more drops in this wing. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

The last Intermediate Distribution Frame (IDF) is in the Teacher's Room in B-Wing. Approximately 144 ports are active. This closet houses (3) 3COM SuperStack 3300 48-port 10/100 switches and (1) 3COM SuperStack 3300 24-port switch for the end-users. Finally, a gigabit fiber-optic backbone from this closet to the MDF is installed for interconnectivity.

Finally, Vets High School also supports 8-10 Computer Labs for academic use. The Media Center Lab is used for student research only. This Lab is equipped with OptiPlex GX150 Tower Computers that are approximately 4 years old. The remaining Labs in the School each contain approximately 24 computers and are used at scheduled sessions only. Any Word Processing or work on projects needs to be completed in the Writing Center. Veterans High School also has video conferencing equipment awarded through a RIDE grant and uses it for connections to RI Hospital to monitor operations.

Toll Gate High School - Toll Gate High School's Local Area Network is comprised of approximately 243 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Microsoft Office used for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 720 data drops and is distributed among four Telecommunication Closets. The Main Distribution Frame (MDF) is located in the Science Wing. Approximately, 192 drops are active. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet houses (4) 3COM SuperStack 4400 48-port 10/100 switches, (1) 3COM SuperStack 4400 24-port 10/100 switch to support the end users terminating in this closet and (1) 3COM SuperStack 4900SX 6-port fiber switch used for backbone connectivity to remote closets. Also, a Cisco 2621 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. All equipment is configured for Layer-2 Services.

The first Intermediate Distribution Frame (IDF) is near the Library in Room B86. Approximately 288 ports are active. This closet houses (6) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

The second Intermediate Distribution Frame (IDF) is near the Main Office in Room B29. Approximately 192 ports are active. This closet houses (4) 3COM SuperStack 4400 Switches, 48-port 10/100, and (1) 3COM SuperStack 4400 24-port switch for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity.

The third Intermediate Distribution Frame (IDF) is in the Music Wing. Approximately 48 ports are active. This closet houses (1) 3COM SuperStack 4400 Switch, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity to the rest of the network.

Toll Gate High School also supports several Computer Labs for academic use. The Drafting Lab houses approximately 20 computers and is used for instruction on AutoCad Lite 2004. The Math Lab has approximately 24 desktops and focuses on Geometry applications. Toll Gate also has (3) Business Labs and the Library has 24 computers dedicated to research.

Finally, Toll Gate High School has a video conferencing equipment setup in one Lab to provide remote instruction in Geometry to a homebound student as part of the IEP requirements.

Career Center at Toll Gate - The Career Center at Toll Gate operates as a separate network from the High School, similar to any other school in the district. The Local Area Network supports approximately 153 computers. The network is used to support five Labs in the Career Center. The Drafting Lab has 24 computers and is used for CAD instruction. The Macintosh Lab, used for computer production, houses approximately 24 desktops. Also, the Career Center has a Cisco Academy Lab used to teach students the concepts of networking, and has 15 workstations. The Electronics Lab utilizes approximately 15 desktops. The Career Center has a Microsoft Lab consisting of 18

computers. This Lab is functional, but since the program was stopped last academic year due to the lack of student participation.

Finally, the network consists of one Telecommunications Closet. The MDF supports approximately 240 active data drops. This closet has (3) Catalyst 3548XL 48-port 10/100 switches, (2) Catalyst 3524XL 24-port switches, and a Cisco 2621XM Router used to interface with the T1 connection to the Frame Cloud for access to the WAN.

Aldrich Junior High School - Aldrich Junior High School's Local Area Network is comprised of approximately 150 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services, Math and Science applications and Internet connectivity. Local Applications include Microsoft Office used for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 288 data drops and is distributed among three Telecommunication Closets. The Main Distribution Frame (MDF) serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet houses (2) Dell PowerConnect 48-port 10/100 Switches and (1) Dell PowerConnect 24-port 10/100 switch to support the end users terminating in this closet. Also, a Cisco 2611 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. As with Vets, all switch equipment in this School is configured for Layer-2 Services.

The first Intermediate Distribution Frame (IDF) supports approximately 120 active ports. This closet houses (3) dell PowerConnect 3048 Switches, 48-port 10/100, for the end-users. There is a gigabit fiber backbone from this closet to the MDF for interconnectivity to the network.

The second Intermediate Distribution Frame (IDF) is in the Basement in the Social Studies Office. Approximately 48 ports are active. This closet houses (1) Dell PowerConnect 3048 Switch, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF.

The Library has (8) PCs dedicated for research. There are three Computer Labs in Aldrich for academic use. The Lab in Room 205 has (26) Dell Optiplex GX150 and GX270s. The second Lab, in Room B7 is a Graphic Arts Lab. It house (12) PCs. Presently, there is no access to this Lab. Finally, there is a Lab with (16) Dell GX270 PCs that is utilized by the students.

Gorton Junior High School - Gorton Junior High School's Local Area Network is comprised of approximately 118 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services, Math and Science applications and Internet connectivity.

Local Applications include Microsoft Office used for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 288 data drops and is distributed among four Telecommunication Closets. The Main Distribution Frame (MDF) is located in Guidance. Approximately, 24 drops are active. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the Internet. This closet houses (1) Cisco Catalyst 3524XL 24-port 10/100 switch to support the end users terminating in this closet. Also, a Cisco 1720 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. As with Vets, all switch equipment in this School is configured for Layer-2 Services, meaning that the network is not providing any additional security beyond what is implemented with Active Directory.

The first Intermediate Distribution Frame (IDF) is in the Copy Room. Approximately 120 ports are active. This closet houses (2) Cisco Catalyst 3548XL Switches, 48-port 10/100, and (1) Catalyst 3524XL 24-port Switch for the end-users. There is a gigabit copper backbone from this closet to Room 110 for interconnectivity to the network.

The second Intermediate Distribution Frame (IDF) is in Room 110. Approximately 96 ports are active. This closet houses (1) Cisco Catalyst 3548XL Switch, 48-port 10/100, and (2) Catalyst 3524XL 24-port Switch for the end-users. There is a gigabit fiber-optic backbone from this closet to the Office IDF in the New Wing and a gigabit copper backbone to the Copy Room for interconnectivity. In addition, there is a wireless bridge installs that connects the Maintenance Building across the street via 11Mb wireless.

The third Intermediate Distribution Frame (IDF) is in the Office in the New Wing. Approximately 48 ports are active. This closet houses (1) Cisco Catalyst 3550G-48 Switch, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to Room 110 for interconnectivity to the rest of the network. Also, there is an Aironet Access Point in this closet support the wireless cart provisioned by the Math department, utilized by students in the area. Note: Gorton Junior High School is the only School in the district that has wireless laptop carts. The School has (2) carts with 30 laptops each.

Winman Junior High School - Winman Junior High School's Local Area Network is comprised of approximately 104 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services, Math and Science applications and Internet connectivity. Local Applications include Microsoft Office used for word processing. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each English and Literacy department/classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 576 data drops and is distributed among five Telecommunication Closets. The Main Distribution Frame (MDF) is located in Computer Science A-200. Approximately, 96 drops are active. The MDF serves as the central wiring closet for the school. This closet houses (2) 3COM SuperStack 4400 48-port 10/100 switches to support the end users terminating in this closet. Also, (1) 3COM SuperStack 12-port fiber switch is installed to terminate the fiber backbones from the remote closets, providing gigabit speeds between closets. As with the other schools, all switch equipment in this School is configured for Layer-2 Services and is not configured for VLANs.

The first Intermediate Distribution Frame (IDF) is in the Main Office. Approximately 96 ports are active. This closet houses (2) 3COM SuperStack 4400 48-port 10/100 switches for the end-users. There is a gigabit copper backbone from this closet to the MDF for interconnectivity to the network.

The second Intermediate Distribution Frame (IDF) is on the lower level in the Storage Room. Approximately 72 ports are active. This closet houses (1) 3COM SuperStack 4400 Switch, 48-port 10/100, and (1) 3COM SuperStack 24-port Switch for the end-users. There is a gigabit fiber-optic backbone from this closet to the Main Office IDF. Also, unlike the other schools, this IDF houses the demarcation point for the connection to the WAN. A Cisco 1720 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud.

The third Intermediate Distribution Frame (IDF) is in the Storage Room across from A-301. Approximately 96 ports are active. This closet houses (2) 3COM SuperStack 4400 Switches, 48-port 10/100 for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF for interconnectivity to the rest of the network.

The fourth Intermediate Distribution Frame (IDF) is in Room B-346. Approximately 192 ports are active. This closet houses (3) 3COM SuperStack 4400 Switches, 48-port 10/100, and (1) 3COM SuperStack 24-port Switch for the end-users. There is a gigabit fiber-optic backbone from this closet to the MDF.

Finally, as with the other Junior High Schools, Winman also has a MaxAttach external Network Data Storage System. This is used by various classes to store student data. In addition, the School has (2) Computer Labs for instruction. The older Lab has approximately (22) computers and is used for word processing. The Drafting Lab has (16) Dell OptiPlex GX270 computers used for CAD instruction.

Drum Rock Elementary School - Drum Rock Elementary School's Local Area Network is comprised of approximately 49 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Leap frog 1, 2, 3 and Math Exemplar. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 192 data drops terminated in one Telecommunication Closet. The Main Distribution Frame (MDF) is located in the Storage Room behind Speech. Approximately, 72 drops are active. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet houses (1) Cisco Catalyst 3524XL 24-port 10/100 switch and a Dell PowerConnect 3348 48-port switch to support the end users terminating in this closet. Also, a Cisco 2801 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. As with the other schools, all switch equipment in this School is configured for Layer-2 Services.

Each classroom has 2-3 computers for students and (1) computer for the teacher to use to access PLP. The Library has (4) computers for Catalog and Circulation. Drum Rock does not have a Computer Lab. Computer usage in this school is in the classroom and Library only.

Holliman Elementary School - Holliman Elementary School's Local Area Network is comprised of approximately 66 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Leap frog 1, 2, 3 and Math Exemplar. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 84 data drops terminated in two Telecommunication Closets. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet terminates approximately 72 data drops. This closet houses (4) 3COM SuperStack 24-port 10/100 switches. Also, a Cisco 1700 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. The IDF closet support 12 data drops. This closet houses (1) 3COM SuperStack 24-port switch. As with the other schools, all switch equipment in this School is configured for Layer-2 Services.

The Library has (4) computers for Catalog and Circulation, and each classroom has 3-4 computers for student use. Holliman does not have a Computer Lab.

Hoxsie Elementary School - Hoxsie Elementary School's Local Area Network is comprised of approximately 51 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Leap frog 1, 2, 3 and Math Exemplar. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 120 data drops terminated in one Telecommunication Closet. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet

houses (5) Intel 460T 48-port 10/100 switches. Also, a Cisco 2821 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. As with the other schools, all switch equipment in this School is configured for Layer-2 Services.

The Library has (4) computers for Catalog and Circulation. Hoxsie does not have a Computer Lab.

Warwick Neck Elementary School - Warwick Neck Elementary School's Local Area Network is comprised of approximately 71 networked devices distributed among a flat Ethernet network. The users on the network utilize it for several applications, including Library Automation, print services and Internet connectivity. Local Applications include Leap frog 1, 2, 3 and Math Exemplar. Staff uses the network for access to the Student Management System, Star Base and Star Portal. Also, one computer in each classroom is dedicated for the teacher for access to the PLP module in Star Base.

The Local Area Network has approximately a total of 192 data drops and is distributed among two Telecommunication Closets. The Main Distribution Frame (MDF) is located in the Main Office. Approximately, 96 drops are active. The MDF serves as the central wiring closet for the school and the demarcation point for telecommunication services for the WAN. This closet houses (4) Enterasys 24-port 10/100 switch to support the end users terminating in this closet. Also, a Cisco 2801 Router is housed in this closet and interfaces with the T1 connection to the Frame Cloud. As with the other schools, all switch equipment in this School is configured for Layer-2 Services.

The first Intermediate Distribution Frame (IDF) is in the Teacher's Room. Approximately 96 ports are active. This closet houses (4) Enterasys 24-port 10/100 switch to support the end users terminating in this closet. There is a 100BaseFX fiber-optic backbone from this closet to the MDF.

Each classroom has several computers for student use. Warwick Neck Elementary School has (1) Computer Lab dedicated for research only.

Server Infrastructure

There are approximately (40) servers in the remote schools for various applications and (19) servers in the Computer Center in the Administration Building. Each High School has (3) servers. The Junior High Schools have (2) servers each. Most of the Elementary Schools have (1) server, with the exception of (4) Elementary Schools that have (2) Servers each. Most of the servers in the Schools are Dell branded and range from P3 451Mhz to P4 3.0Ghz. All of the servers, except for one at Gorton Junior High, are running Windows 2000 Server SP4. The Schools have the following servers:

Aldrich Junior High:

- Application Server: Dell PowerEdge 1400SC 1.13Ghz, 512MB RAM, 18GB Hard Drive
- Application Server #2: Dell PowerEdge P4, 512MB RAM, 36GB Hard Drive

Cedar Hill Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive
- Application Server #2: Dell PowerEdge P4 2.4Ghz, 512MB RAM, 18GB Hard Drive

Drum Rock Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive
- Application Server #2: P3, 256MB RAM, 18GB Hard Drive

Francis Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Gorton Junior High:

- Application Server: P3, 256MB RAM, 9GB Hard Drive
- Application Server #2: P3 451Mhz, 256MB RAM, 18GB Hard Drive
- Application Server #3: Dell PowerEdge 1400SC 1.13Ghz, 512MB RAM, 18GB Hard Drive

Greene Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Greenwood Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Holden Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Holliman Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Hoxsie Elementary School:

- Application: P3, 256MB RAM, 9GB Hard Drive
- Application Server #2: Dell PowerEdge P4 2.4Ghz, 512MB RAM, 18GB Hard Drive

Lippitt Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Norwood Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Oakland Beach Elementary School:

- Application: P3, 256MB RAM, 9GB Hard Drive
- Application Server #2: Dell PowerEdge P4 2.4Ghz, 512MB RAM, 18GB Hard Drive

Park Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Pilgrim High School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive
- Application Server: Dell PowerEdge P4 2.4Ghz, 512MB RAM, 18GB Hard Drive
- Secondary Domain Controller: Dell PowerEdge P4 2.4Ghz, 512MB RAM, 18GB Hard Drive
- Portfolio Server (to be retasked as a Domain Controller): Server standard 2003, p4 2.8GHz 1.0GB RAM Dell PE 700

Potowomut Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Rhodes Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Robertson Elementary School:

- Application Server: P3, 256MB RAM, 18GB Hard Drive

Scott Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Sherman Elementary School:

- Application Server: Dell PowerEdge 1400SC 1.13Ghz, 512MB RAM, 18GB Hard Drive

Tollgate High School:

- Application Server: P3, 128MB RAM, 9GB Hard Drive for Tech Ed CAD
- Application Server: P3, 256MB RAM, 18GB Hard Drive for the Library (Follett's)
- Secondary Domain Controller: Dell PowerEdge P4, 512MB RAM, 36GB Hard Drive

Veterans Memorial High School:

- Application Server: Dell PowerEdge 1400SC 1.13Ghz, 512MB RAM, 18GB Hard Drive
- Secondary Domain Controller: Dell PowerEdge 1400SC 1.13Ghz, 512MB RAM, 18GB Hard Drive

Warwick Neck Elementary School:

- Application Server: P3, 256MB RAM, 18GB Hard Drive

Wickes Elementary School:

- Application Server: P3, 256MB RAM, 9GB Hard Drive

Winman Junior High:

- Application Server: P3, 128MB RAM, 9GB Hard Drive
- Secondary Domain Controller: Dell PowerEdge P4, 512MB RAM, 36GB Hard Drive

Wyman Elementary School:

- Application Server: P3, 256MB RAM, 18GB Hard Drive

The district is supported by the following servers:

- *WPS-NAVI*: Dell 1300 for Norton Anti-Virus v10 Corporate Edition
- *WPS-FS1*: Domain Controller running Windows 2003 Server
- *WPS-EDULOG*: supports FoxPro Transportation 2000 Application
- *Star Base Web Server*: Dell PowerEdge 2550 running Windows 2003 Server
- *Star Portal*: (for Portal Users): Dell PowerEdge 1750 running Windows 2003 Server and acts as a Domain Controller to separate domain
- *STPortal*: Dell PowerEdge 2650 running Windows 2003 Server provides portal access to PLP's
- *Stardb*: Oracle Database Server
- *Pentamation*: Financial Package: Dell PowerEdge 2850 running SCO UNIX
- *WebSense Reporter*: Dell PowerEdge 2850 running Windows 2003 Server
- *WPS-Exch3*: Dell PowerEdge 2850 running Windows 2003 Server and Exchange 2003
- *Backup*: runs Backup Exec v10.0 and backs up the 17 servers in the Computer Center; Also runs Legato Replistor to create active mirrors of 2 servers)
- *WPS-FS3*: File/Print Server for Administration Building and remote users (School Offices)
- *DC2*: Dell PowerEdge 4000SC running Windows 2003 Server – User domain for Portal Server
- *Providence*: Dell PowerEdge 1400SC running Windows 2000 Server – Backup for Admin domain and DNS for Windows 2000 users
- *WPS-DHCP1*: Dell PowerEdge 1400SC running Windows 2000 Server – provides DNS and DHCP services for all users
- *www*: Dell PowerEdge 1400SC – currently is the web server but will become DNS server when new web server comes online
- *Mail1*: Dell PowerEdge 2800 used for Teacher Mail
- *Intranet*: Clone used by (2) Junior High Schools for Intranet services
- *Scopeware Server*: Dell PowerEdge 4400 used for document Management
- *VAX* – AS/400 archives older Financial and Student Information System data

Backup

The district is in the process of implementing a Disaster Recovery Plan for Backup. Presently, the servers in the remote schools are not backed up. As a result, students need to save their files locally to a floppy or USB Jump Drive instead of on the server. The district maintains a base image of the OS for each server to utilize in case of failure. As

part of a new Backup Project, the district has implemented an EMC Clarion CX300 for Disaster Recovery. This project is divided into 2 phases. Phase 1 of this project, which is complete, was to configure backup to disk of all the Servers in the Computer Center. It uses Legato Replistor for replication of data to disk. Data is replicated every 30 minutes. The servers that are replicated are Stportal, Stardb, and WPS-EXCH3.

Following are the list of servers that are connected to the SAN, and the size of the data LUN that has been carved out to support it:

- *Wps-fs3*: 160GB LUN for file and print sharing – all data is on the SAN
- *Wps-exch3*: 133GB LUN currently for Exchange Information Store, but will be replaced with Firstclass
- *Wps-edulog*: 5GB LUN for Transportation DB server – The Database files are not currently on the SAN, but will be moved to the SAN over the summer
- *Replication*: 103GB LUN stores all of the replicated data onto the SAN from the server snapshots.
- *Stardb*: 20GB LUN for daily backups of the database
- *Stportal*: 20GB LUN for future expansion space for profiles when teacher data is moved to this system
- *Scopeware*: 241.57GB LUN for expansion room for document imaging / archival
- *Websense*: 20GB LUN for the reporting database of this application

All hosts have (2) Qlogic HBA Adapters connected to (2) separate SAN fabrics and are redundant. There are (2) McData 4500 Fiber Channel Switches cross-connected to (2) Storage Processors on the EMC Clariion.

For off-site backup, the District utilizes Backup Exec v10.0, running on the Replication Server, to perform a tape backup of the backup data on disk. A Dell PowerVault 132T Tape Library is directly attached. Tapes are stored off-site by Fire Mountain. The tapes are picked up weekly. Tapes are stored in a fire-proof safe in the Administration Building until picked up by Iron Mountain.

Phase 2 of the project is budgeted for next funding year and incorporates the remote servers in the district into the backup strategy.

Finally, the Administration utilizes the application Pentamation for financial management. This system is not included in the backup scheme. Backup of this server is local and performed as part of SCO Unix.

Applications

The users access the network for a variety of applications, including Follett's Library Automation, various curriculum applications, Print Services, and Internet Access. Applications vary by School, as follows:

Elementary Server Applications:

- Follett Library Automation
- Fitnessgram
- Instant Reader
- Leap Frog 1,2 and 3
- Math Exemplar
- Visual Planner
- GLE-Support
- Office 2000
- Publisher 2000
- Norton Anti-Virus Corporate Edition

Junior High School Server Applications:

- Follett Library Automation
- Fitnessgram
- Math Exemplar
- Visual Planner
- Algebra
- Various Math and Science Applications
- Online Encyclopedias
- Tech Ed Folders for student work (CAD)
- Office 2000
- Publisher 2000
- Norton Anti-Virus Corporate Edition

High School Server Applications:

- Follett Library Automation
- Fitnessgram
- Visual Planner
- Choices (Guidance Application)
- Various Business Applications, Tutorials, and Online Workbooks
- Various Math, Science, and Social Studies Applications
- Online Encyclopedias
- Tech Ed Folders for student work (CAD and presentations)
- Office 2000
- Publisher 2000
- Norton Anti-Virus Corporate Edition

The Staff also uses the network to gain access to the Student Management System, Century Star Portal/Star Base. Star Base is the Oracle back-end of the Student Management System and Star Portal is the web front-end. StarBase is used for report cards, attendance, academic history, scheduling, grading, and PLPs. There is also a Medical module utilized by the Nurses in the district. Clerical people in each School perform the Data Entry. Teachers utilize the application to gain access to the PLP process only. In the elementary schools, the Main Office Secretary and the Principal update StarBase. In the Secondary Education Schools, the Main Office Secretaries and Guidance access and update the data in the database. The data in the Attendance module reflects morning Home Room attendance and truancy only. For 3rd quarter grading, the district will be doing a pilot with approximately 24 teachers at (1) Junior High School and (1) High School to do online grading for a single subject.

Administration utilizes Pentamation for financial and personnel data. There are approximately 40 users that access Pentamation. The majority of the users are located in Administration. The remote schools have read-only access. Administration is running a 1999 version of the software. All financial data prior to 1999 is stored on the AS/400. They are looking at upgrading to a new financial package in the next 12-18 months.

The network is also used for authentication, DNS, and DHCP services. These services are served centrally from the Computer Center at the Administration Building. If there is a Wide-Area Network failure, PCs that have already obtained an IP Address via DHCP and updated DNS information will be able to continue to function, but will not have access to any applications served from the Computer Center. If a PC has not obtained an IP Address that day, then that computer will not have access to any services at all.

Presently, File Services at each school are local to the computer. Each Student and Teacher has a generic login to the network. All files are saved locally on either a floppy disk or an external USB Jump Drive. For the Math and Tech Ed departments in the High Schools, an external Maxtor Storage system has been installed to save their students' data. The three High schools will each receive a new File Server in FY06 for Digital Portfolios, as part of a grant and Title IID monies. The other schools will continue to save locally to floppy or an external USB Drive.

Currently, Email is supported on two systems, Post Office and Exchange 2003. Post Office, running on Windows NT Server, provides teachers with email services. Exchange 2003 is used by Administration, Guidance, Department Heads, and other Staff. The district has just gone out to bid for a new Email solution, First Class, to consolidate the two systems in place. First Class would replace both Post Office Mail and Exchange 2003 to provide mail for teachers, Administration, School Committee, Guidance, Department Heads, Staff, and potentially High school Students.

Finally, the IT Staff utilizes several tools for technology administration. Primarily, they utilize Ghost to image desktops and laptops. They keep copies of all images for quick restore in case a computer needs to be re-imaged.

Staffing

The IT Staff that supports the Information Technology Systems in the district consists of the Manager of Information Systems, the Assistant Information Services Manager, (4) Technicians, (1) Systems Analyst and (3) Data Specialists. There are plans to add a 5th Technician in the next 3 months.

The Manager of Information Systems is responsible for the coordination of the administrative technological and operations of the district, as well as, the evaluation and implementation of computers and technology in all administrative programs. Also, this position includes the responsibilities of Supervising the IS Department and its staff.

The Assistant Information Services Manager maintains the network and server infrastructures. This position reports directly to the Manager of Information Systems. Responsibilities include the day-to-day LAN/WAN activity, provide security for data on the network, manage network traffic, maintain user accounts, oversee monitoring and network monitoring services, software vendors and maintain system documentation.

The Technicians are responsible for the repair, upgrading, and maintenance of all computers and computer-related technology in the district. The Technicians support 30 locations and work on a rotating school schedule. One week is dedicated to the Secondary Schools and the following week is dedicated to the Elementary Schools. The Technicians report directly to the Assistant Information Services Manager.

The Systems Analyst maintains the databases for StarBase and Pentamation. This position receives supervision from the Manager of Information Systems. Responsibilities include some programming of the databases with Oracle utilities and supervising the Data Specialists.

The Data Specialists act as the backup to the Systems Analyst and provide Help-Desk support to the end users (to the teacher level). They are responsible for the State reporting of data for the district. In addition, the Data Specialists create database processes for various form generation for the district, such as building access, event planning, and misc. billing. They are also responsible for file and record maintenance in the databases. This position reports directly to the Systems Analyst.

One position that has been vacant for over a year is an Educational Technology Specialist. This position works with the School and its teachers to integrate technology into the curriculum and act as a liaison between the Educators and the IS Staff to develop the plans and acquisition of needed technology. The district has approved a new position, Technology Applications/Assessment Coordinator, to fill this older position. This position will be responsible for the supervision, initiation, development, and execution of services connected with the application of technology K12 and compliance with assigned assessment requirements.

Responsibilities include:

- Supervision and coordination of the Media and Educational Technology staff
- Develop and maintain manual of policies and guidelines related to technology and media in conduction with the Manager of Information Services
- Oversee the application of all educational technology used to support instruction, curriculum and assessment.
- Provide staff development in technology applications including those related to instruction, curriculum and assessment
- Work with K-12 Curriculum and District Strategic Planning committees for technology integration
- Prepare the annual Media/Technology budget and report
- Chair and organize the district Graduation by Proficiency Design Team; Meet and support regularly with school-based staff on graduation by proficiency issues
- Development and implement a Senior Exhibition Project and Digital Portfolio Handbooks
- Develop instruments for graduation by proficiency program assessment in compliance with RIDE guidelines and expectations

End-User Support

Support for the end-users are based on a ticket and scheduling system. If an end-user requires assistance, the end-user emails the Help Desk with the details. These emails are reviewed and prioritized by the IT Staff. The Technicians are scheduled to visit each School on specific days. One week is dedicated to the Secondary Schools and the following week is dedicated to the Elementary Schools. Emergencies are escalated to the top of the list and scheduled accordingly. Presently, there is no system or procedure in place to track response time, turn-around time or frequency. As noted in the recommendations section, the district needs to implement a management tool for tracking purposes.

Professional development

The IT Staff of Warwick School District does not take a major role in the actual Professional Development of the end users, with exception of any training that is needed to support a district initiative or an administrative application. For example, with the addition of the new PLP module in Star Base, any training required on that module will be performed by the IT Staff. If the training is educational technology-based, then that will be completed by the Technology Application Assessments Coordinator. The IT Staff will work with that Technology Application Assessment Coordinator to make sure the required technology is in place for the training. If training is needed for the Administrative Staff, then that will be performed by the IT Team.

The IT Staff also requires Professional Development. The Manager Of Information Systems determines the needs for additional training for each staff member and sends him/her to the appropriate training to support their job requirements.

Contracts

The IT Staff of the Warwick School Department utilizes approximately (20) contracts to gain support for the district system and provide on-going services for the critical components of the technology infrastructure.

For Internet Access and WAN connectivity, as described previously, the district has engaged with RINET (Rhode Island Network for Education Technology). The annual FY06 cost of this contract is approximately \$76,000. This includes the T1 connection from each School to the Frame Cloud, the T3 connection from Administration to the Frame Cloud and the 20MB Internet connection to RINET. This contract does not include maintenance. Maintenance is procured through a separate contract with Atrion.

For the network management, maintenance, and monitoring of the Wide-Area Network, the School District has engaged into a contract with Atrion. Atrion monitors the WAN on a 24x7 basis. The district has been utilizing Atrion for approximately 8 years. Since Atrion has such an in-depth knowledge of the system, the district utilizes the organization for planning and design purposes. Currently, the contract is broken into two components, network management/maintenance and network monitoring. The network management/maintenance (called MAXTime Support Agreement) contract costs approximately \$35,000 annually and includes only the equipment to the edge of each school. The contract does not include any network equipment beyond the Wide-Area Network. It does include 24x7 remote telephone support with a 2 hour callback and updates within 4 hours, 24x7 onsite support for only the equipment covered under contract, spare parts delivery same day within 4 hours, and managed services. The monitoring contract costs approximately \$26,500 annually. If an issue with the WAN occurs, Atrion will attempt to resolve the problem remotely. If unable, the company will dispatch an Engineer onsite to address the issue.

Atrion monitors the following equipment:

Administration Building:

- Cisco Catalyst 4507 Core Switch
- Packeteer PacketShaper 2500
- Cisco PIX 525
- Cisco 3725 Router
- (2) Cisco Catalyst 3524XL
- Cisco Catalyst 3548XL
- Cisco Aironet 1220 Access Point

Maintenance:

- Cisco Aironet BR350 Wireless Bridge
- Cisco Aironet 1220 Access Point

Gorton Junior High School:

- Cisco Aironet BR350 Wireless Bridge
- Cisco 1720 Router (for WAN connection)

Lippitt Elementary School:

- Cisco 1720 Router (for WAN connection)
- Cisco Aironet 1231 Access Point

Greenwood Elementary School:

- Cisco 2801 Router (for WAN connection)
- Cisco Aironet 1231 Access Point

The remaining schools only have their respective WAN router under contract, as follows:

- *Aldrich Junior High:* Cisco 2621 Router
- *Career Center:* Cisco 2621 Router
- *Cedar Hill School:* Cisco 2801 Router
- *Drum Rock School:* Cisco 2801 Router
- *Greene School:* Cisco 2801 Router
- *Holden School:* Cisco 2801 Router
- *Holliman School:* Cisco 2801 Router
- *Hoxsie School:* Cisco 2801 Router
- *JB Francis School:* Cisco 1720 Router
- *Norwood School:* Cisco 2801 Router
- *Oakland Beach School:* Cisco 2801 Router
- *Pilgrim High School:* Cisco 2621 Router
- *Potowomut School:* Cisco 1720 Router
- *Rhodes School:* Cisco 2801 Router
- *Robertson School:* Cisco 2801 Router
- *Scott School:* Cisco 2801 Router
- *Sherman School:* Cisco 2801 Router
- *TollGate High School:* Cisco 2621 Router
- *Wickes School:* Cisco 2801 Router
- *Winman Junior High School:* Cisco 1720 Router
- *Wyman School:* Cisco 1720 Router
- *Vets High School:* Cisco 2621 Router

Several of the key academic and administrative applications and hardware are also covered under contract. The SunGuard Pentamation Financial package is covered under a Maintenance and Upgrade Contract that costs approximately \$56,000 annually. This contract covers Human Resources, Financial Accounting, 4Js, Cognos, Opti, software licensing and upgrades, diagnostics, Easy Spooler, Formsxpress, SCO Unix, Informix DB Engine and License. Pentamation runs on a Compaq ProLiant 6000 that has extended hardware warranty to provide for onsite parts and labor. This maintenance costs \$2,800 per year.

For the Student Management System, StarBase, the district has a contract with Century Consultants for software support and maintenance that costs approximately \$38,000. StarBase runs on Dell PowerEdge 2400 Server. The extended warranty maintenance agreement for this server is approximately \$2,800.

To provide for content filtering, the district utilizes WebSense and has approximately 2000 licenses. The yearly renewal for WebSense is \$56,000.

Another key academic contract is the Microsoft School License Agreement. This contract provides support and upgrades for the following Microsoft products:

- Operating System
- Office Professional XP
- Visual Studio
- Encarta
- Client Access License for Microsoft Server

This agreement includes coverage for 3,000 licenses and is approximately \$117,600 yearly.

For Anti-Virus protection, the district has acquired a contract for Symantec Anti-Virus which is approximately \$24,000 yearly for renewal and additional licenses.

For Library Automation, the district has invested in Follett's and has a yearly contract for hardware and software support for 26 locations. It includes Circulation and Catalog, PHD, and Scanners. The yearly cost for this contract is \$22,000. The Web Clarity software component of Follett's for each school is \$99 per year, for a total yearly contract cost of \$2,574.

In addition to the software support contracts in place, the Warwick School Department invests in several hardware support and maintenance contracts, as well. For server support, all servers are purchased with a 3-year onsite warranty for parts and labor. The district has invested in extended warranty contracts for any server less than 5 years old through Dell. The Extended coverage provides parts and labor support. Costs vary by model. For Microsoft Network Operating System support for these servers, the district has a 5-Incident Application Support Contract direct with Microsoft, which costs \$1225 per year.

Desktops and laptops are also purchased with a 3-year warranty. Extended coverage for the desktops varies. The district does have a contract in place with Dell for 2-year maintenance renewal on a number of computers. This equates to approximately \$20,000 per year. The laptop warranty does not include accidental insurance.

Finally, the district has several critical hardware components that require maintenance coverage as follows:

- *Decision One:* covers the VAX Hardware that houses archived Financial and Student Management info – coverage includes the maintenance of the VAXC, associated printers and DecServers: \$2,400
- *Source Technologies:* provides hardware maintenance for the Payroll Check Printer: \$1,200
- *Iron Mountain Tape Facility:* provides off-site storage for backup tapes (weekly pickup): \$2,160