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# **Information Systems Master Plan**

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Town of  
Plymouth

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6/8/05

Submitted by: JFK Systems, LLC

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## INTRODUCTION

In accordance with our proposal dated 11/22/04, we are pleased to provide this Information Systems Master Plan to the Town of Plymouth. It includes several recommendations to improve the Town's IT Infrastructure and Applications over the next 3 years, for a total cost of approximately \$2.3 million. Estimated annual operating costs of our recommendations are approximately \$275,000.

As per our agreement, this study did not include the School Department, with the exception of its use of the Town's Financial Management System. Also excluded from this study were Public Safety applications, Geographic Information Systems (GIS), and Property Appraisal applications. Therefore, the study focused on General Government IT infrastructure and production applications.

The majority of the IT Infrastructure information contained in this report was provided by the Town, either through interviews or by Town-provided documents. We did not conduct any inventories or audits of IT assets. Regarding the major production applications of Financial Management and Land Records, we did conduct limited interviews with Town personnel.

# OBSERVATIONS AND ANALYSIS

## I. WAN

### Description

The Town's network services are distributed to remote locations over its Wide Area Network, or WAN. The following sites are connected to the Town's WAN:

- Town Hall
- Police
- Fire HQ
- Maintenance Facility (Camelot Park)
- Fire Stations 2, 3, 4, 5, 6 and 7
- Emergency Preparedness
- Council on Aging
- Main Library
- Manomet Library
- Airport
- Sewer Plant
- Harbor Master
- School Administration

Town buildings are connected to the municipal network backbone by either 1) VPN (virtual private network) links over Adelphia Communications' CATV broadband network or 2) direct dial-up modem links via a remote access server connected to the Town's network. All data services, including mission systems, e-mail and connection to the Internet are carried over these transports.

The School Administration building is connected to the Town Office via a Managed Frame Relay link from Verizon.

Buildings using the Adelphia network are connected to it by LanCity cable modems, which the carrier states are tuned to provide 10Mbps of upstream and downstream traffic. Links between the remote sites and Town Hall are established over a dedicated broadband channel by Adelphia's LCN server (the head-end, or management server), which isolates Town communications from all other residential and commercial subscribers. This network is provided free of charge as part of Adelphia's cable agreement with the Town.

Town locations without broadband cable services (Airport, Manomet Library, COA and Emergency Preparedness) access Town services over 56kbps dial-up modem links. These links are established, maintained and secured internally by a Microsoft Remote Access Server. As noted above, School Administration connects to the Town Office via a managed Frame Relay link provided by Verizon.

### **Stability**

The Adelphia network has grown increasingly unstable over the last several years. While no clear reason for this condition has surfaced in this study, the following factors are likely contributors:

1. The head-end and CPE (customer premises equipment) is proprietary, first-generation and non-DOCSIS (the broadband cable standard) compliant. This technology has, based on current cable modem technology standards, reached the end of its useful life.
2. According to the Town, major changes to Adelphia's overall network topology have taken place since the WAN's original implementation, some of which have likely caused problems for the Town's network. Because all links are completely unmanaged by the provider, however, they offer no evidence to support or challenge this possibility.
3. The equipment is simply old and beyond the end of its support cycle. Firmware updates created to address new obstacles are no longer developed.

As a result of this instability, the Town has been forced to implement inefficient and in some cases impractical solutions. For example, the Town supports multiple domains and e-mail servers at larger remote sites to reduce the impact of Adelphia network failures. In a stable environment, one domain and one mail server operating over a flat network would be a much more practical and manageable solution.

The dial-up and Frame Relay links are somewhat more stable.

It is our opinion that the Town's WAN represents a major weakness in its IT infrastructure, and the WAN's instability is the most significant technical impediment the Town faces as it seeks to provide 21<sup>st</sup> century municipal services.

### **Performance**

While Adelphia claims to have capped bandwidth for each remote site at 10Mbps, based on user complaints and IT department observations, it's quite likely that the actual bandwidth amounts to only a small fraction of the 10Mbps number. To date, the provider has not answered IT requests to provide practical data to support its claim or identify possible performance bottlenecks.

Given current utilization loads, the Adelphia network does not provide acceptable performance. Given normal growth rates in bandwidth demand, performance problems will only grow with time.

Even with optimal compression rates and ideal environmental conditions, dial-up communications can no longer provide adequate performance for most Town applications.

Again, given expected growth patterns in production applications, the Town cannot expect this technology to support users' needs beyond the very near future.

### **Security**

Security on Adelphia's network is preserved mainly by virtual private network (VPN) technology, which establishes secure IPSec VPN connection paths between remote locations and the Town Hall. While this technology does work towards preventing unauthorized access to the Town's network, it does not prevent tampering with the data itself as it travels on the RF network and thus is not completely secured over this medium.

Simple dial-up communications are also at risk to similar security vulnerabilities. Unencrypted data traveling over any medium is susceptible to theft and tampering, leaving important information (such as usernames and passwords) exposed.

Our WAN recommendation in this report will substantially minimize these risks.

### **Service and Support**

Adelphia offers the Town minimal support for its network. It is not uncommon for technical support calls to go days without resolution. LanCity modems are no longer in production and very difficult to acquire in the event of failure.

The Town maintains its own modems and RAS server for dial-up links. Line problems are serviced by Verizon and are resolved through normal provider support channels.

The Town's WAN is addressed in [Recommendation 1](#).

## **II. LANS**

### **Description**

Local area networks (LANs) exist in the Town Hall, Police, Fire HQ and Library. For the purposes of this study, LANs are defined as the components involved in connecting Town PCs, servers, printers and other network resources within a building or agency.

### **Cabling Systems**

Twisted-pair copper cabling systems are used in all LAN segments, and each consists of components meeting Category 5 or 5e standards. Some locations however, lack standard interconnect components, such as patch panels, cable management systems and workstation outlets. These conditions often contribute to performance problems that are difficult to troubleshoot. Field certification tests on the Town's LAN cabling systems are not within the scope of this study, therefore actual performance ratings are not available.

### **Network Hardware**

Hubs, switches and routers are the devices used to connect PCs to servers, printers and other services on the Town's network. These devices form the core of the Town's LANs.

The Town's inventory of these devices consists of equipment from multiple vendors, with varying age, condition, technical capabilities and port speeds. While most routers are current models, some of the hubs and switches are not. None of these devices have native management or advanced features such as VLAN or Layer 3 routing capabilities.

A number of unmanaged, 24-port Layer 2 switches service all connections at the Town Hall, including links to the Adelpia network and the Internet. These switches provide dedicated wire speeds of either 10Mbps or 100Mbps, depending on the capacity of the device connecting to it. While these switches are generally targeted for small office and small business environments, they provide acceptable performance given the Town's current requirements. Their ports, however, have been fully populated, and therefore any further device expansion (PCs or printers) will require one or more additional switches. These devices have been in service for less than one year, and they carry a 5-year limited warranty.

These switches also provide uplinks to workgroup-class switches that provide servers access to the network's core. This configuration is not recommended for production servers, and should be addressed.

The network hardware supporting other LANs would all be classified as 'economy grade' devices: they are unmanaged hubs, switches and routers with low port counts and no scalability. Most are out of warranty with no maintenance agreement in place.

LAN cabling and hardware considerations are addressed in [Recommendation 2](#).

### **Service and Support**

The Town's IT staff performs all installation, configuration and support of LAN components. At present, there are no "break/fix" agreements with service vendors for any LAN equipment, and given the equipment's replacement cost and overall level of sophistication, this is most likely an appropriate model.

Any equipment not covered by warranty is replaced if it fails. At present, annual estimates for "repairs and maintenance" needs, including all IT inventory, are submitted in the IT departments operating budget requests. The Town purchases replacement equipment from local vendors, some of which are on the State contract.

### **III. Servers**

The Town's IT department manages a total of 9 servers in 4 buildings. These systems provide most of the production applications for Town agencies. Server roles and other descriptive information are provided below.

#### **GIS2\_THALL**

*Server Role:* Backup Domain Controller (BDC) and Payroll server.

*Basic Configuration:* PIII-Xeon 2.4Ghz, 1.25GB RAM, 100+GB RAID 5 storage, Lustrum 215 tape backup.

*Operating System:* Windows 2000 Server

*Major Applications:* Payroll.

This server was purchased earlier this year and supports current applications well. Windows Server 2003 license purchased will allow for upgrade at an appropriate time.

#### **COM1\_THALL**

*Server Role:* Internal Mail Server, DHCP, RAS, IIS

*Basic Configuration:* PIII-Xeon 2.4Ghz, 1GB RAM, 90GB HD

*Operating System:* Windows 2000 Server

*Major Applications:* Exchange Server 5.5

This system is not covered by warranty or maintenance contract. Town IT is responsible for maintenance and support of this system.

#### **OA2\_THALL**

*Server Role:* Primary Domain Controller (PDC), WINS, File and Print

*Basic Configuration:* PIII-Xeon 2.4Ghz, 1.25GB RAM, 100+GB RAID 5 storage, Ultrum 215 tape backup.

*Operating System:* Windows 2000 Server

*Major Applications:* PDC, File & Print

As the PDC for the Town's network, this server's primary role is to provide authentication and shared resource security services for all Town users. In addition, it serves as the principal office automation server and hosts all network file storage and network print services.

This server was purchased earlier this year and supports current applications well. Windows Server 2003 license purchased will allow for upgrade at an appropriate time.

## **ISA1\_THALL**

*Server Role:* ISA Server

*Basic Configuration:* PIII-Xeon 2.2Ghz; 1GB RAM

*Operating System:* Windows 2000 Server

*Major Applications:* ISA Server

This server hosts Microsoft ISA Server and is the Town's firewall, web proxy and gateway to the Internet.

This server is still under warranty and is configured appropriately to support the above services through FY06.

## **ASSESSOR**

*Server Role:* Patriot Properties Assessor System, DNS

*Basic Configuration:* P-III, 512MB RAM, 34GB HD

*Operating System:* Windows NT 4

*Major Applications:* Patriot Properties, MS SQL 7, DNS

This server supports Patriot Properties appraisal system, which runs on Microsoft SQL server 7.0.

## **CAD\_THALL**

*Server Role:* CAD and Engineering

*Basic Configuration:* P-III, 1GB RAM, 70GB HD

*Operating System:* Windows 2000 Server

*Major Applications:* Autodesk AutoCAD and ESRI ArcInfo GIS software

This server is barely able to support the applications currently running on it.

This system is not covered by warranty or maintenance contract. Town IT is responsible for maintenance and support of this system.

## **OA1\_LIBRARY**

*Server Role:* PDC, File & Print, WINS and Exchange

*Basic Configuration:* PII-200Mhz, 98MB RAM, 2GB HD

*Operating System:* Windows NT Server 4.0

*Major Applications:* Exchange 5.5.

As a PDC, this server provides primary authentication services for the Library domain. It also hosts Exchange Server services and provides file and print services for the Library.

This system is not covered by warranty or maintenance contract. Town IT is responsible for maintenance and support of this system.

This system is well beneath the recommended configuration for any server, in particular one performing such a significant role on the network.

### **OA1\_FIRE**

*Server Role:* PDC, File and Print, WINS

*Basic Configuration:* PII-200Mhz, 163MB RAM, 8GB HD

*Operating System:* Windows NT Server 4.0

*Major Applications:* None

This server was installed to provide file and print services to the Fire HQ. It is configured as a domain controller with its own domain, PLY\_FIRE.

This system is not covered by warranty or maintenance contract. Town IT is responsible for maintenance and support of this system.

This system is well beneath the recommended configuration for any server, in particular one performing such a significant role on the network.

### **OA2\_FIRE**

*Server Role:* Exchange

*Basic Configuration:* PIII, 512MB RAM, 70GB HD

*Operating System:* Windows 2000 Server

*Major Applications:* Exchange 5.5

This server was installed to provide Exchange e-mail services for the Fire HQ.

This system is no longer covered by warranty or maintenance contract. Town IT is responsible for maintenance and support of this system.

This system provides adequate performance given its existing workload.

### **DATANATIONAL**

*Server Role:* Data National System

*Basic Configuration:* Compaq Proliant 5500 PIII-Xeon

*Operating System:* SCO Unix

*Major Applications:* Data National

Recommendations regarding server upgrades and replacements are in [Recommendation 4](#).

## **IV. Network Platforms, Systems & Services**

### **Network Operating Systems**

The Town currently operates with three different Network Operating Systems (NOS): Windows 2000 Server, Windows NT Server, and SCO Unix.

The Town's network security is controlled by Microsoft Windows domains operating in what is known as "mixed-mode", which utilizes both Windows NT and Windows 2000 technologies. There is one master domain at the Town Hall and resource domains in the Library, Police and Fire Department.

The need for the 4-domain model is driven not by security considerations but primarily by the WAN's instability and poor performance. These conditions made local authentication and e-mail services a necessity, despite the additional cost and management overhead associated with the multi-domain model deployment.

Although the model is somewhat functional, it is rapidly approaching the end of its useful life. The following factors drive the need to consolidate authentication and e-mail services over a Windows 2003 single domain:

- Windows NT is notoriously unstable and its driver support is relatively poor. Microsoft's latest NOS offerings are much less prone to failure.
- Microsoft's support lifecycle for Windows NT ended in June, 2004. Hotfix support and security patches are no longer available.
- Microsoft's support lifecycle for Exchange 5.5 will end in December, 2005.
- New production applications will likely require fully-integrated Windows 200x Active Directory services.

At present, the Town faces two major impediments to progress in this upgrade project:

- The WAN architecture cannot support advanced, consolidated services in a single domain model.
- The funds required to purchase the hardware, software and services for this project have not been appropriated.

Town IT staff has not received training in Windows 200x architecture. Post-implementation support for this migration requires skills well beyond a casual acquaintance with Windows 200x and its native services.

SCO Unix 7 is the host operating system for the Data National accounting system. The vendor is the sole support and management resource for this system; the Town's IT staff has very limited involvement with it.

Recommendations regarding NOS are addressed in [Recommendation 5](#).

## **E-Mail**

As noted previously, the Town utilizes Microsoft Exchange Server 5.5 for its e-mail services. Servers are located in the Town Hall, Fire HQ and Library.

Mainstream support for Exchange 5.5 ended in 2003. Extended hot fix support is available by applying for the service directly to Microsoft. This support will end completely in December 2005.

Until recently, "Spam", or unsolicited e-mail, has been a major problem for the Town. At JFK Systems' recommendation, the Town is in the process of deploying a new spam firewall manufactured by Barracuda Networks. This appliance will instantly block at least 50% of all spam, and with continued tuning and maintenance, it will identify 80% or more with limited false positives. This will greatly reduce the diminished productivity associated with spam overhead.

This solution only filters mail for the Town server, however. Fire and the Library remain unprotected.

It is our opinion that Exchange 5.5 will not serve the Town's needs in the future.

Town e-mail systems are addressed in [Recommendation 7](#).

## **Internet**

Adelphia provides internet services for all Town users, including all remotes, via a single link connected to its broadband backbone. As is the case with all Adelphia-based segments, actual throughput is unknown at this point. The vendor claims that the segment provides bandwidth of "up to" 4Mbps downstream and 512Mbps upstream.

The performance of the service is often poor, particularly during peak-usage periods. Recently, there have been several service failures that have prompted the Town to seek alternative sources of internet access.

All inbound and outbound internet traffic is filtered by a Microsoft ISA Server and a Cisco VPN Concentrator installed between the Town's network and the internet. If configured properly, these components provide excellent perimeter security against intrusion and attack from the outside. The VPN concentrator provides secure remote access and LAN-to-LAN VPN support for all remote sites.

At present, the internet is not used for mission-related processes or services. Most users consider it to be a vital network service however; e-mail is now integral to most users' daily communications, and many use web browsing extensively for research. Note that e-mail transports within Town buildings are not affected by Internet connectivity.

Adelphia provides this service to the Town as part of its overall network service commitment.

Internet services are addressed in [Recommendation 3](#).

## **Data Storage**

For the purposes of this study, data will be classified as either:

- Application data – databases produced by production applications, such as DNC
- User data – files produced by office productivity software, such as Word, Excel, etc.

Application data is stored on the servers that host the application. The structure of the data storage model is determined by the application vendor.

User data is stored on local hard drives and on the “OA” servers. Most users have a mapped drive pointing to a shared folder on the server, and a majority of the users’ published documents are stored there.

The structure of this shared resource has become increasingly disorganized, and there is no established framework or guidelines for the resources’ use. As a result, files and directories are created and stored unmethodically and oftentimes difficult to locate.

Data storage model issues are addressed in Recommendation 15.

## **Backup**

Backup of application and user data is performed by the Town’s IT staff.

The IT department has created backup procedures for all Town system backup processes. Based on information provided by the Town, it appears that essential data is backed up regularly.

There is no centralized mechanism for this service. All servers are backed up independently with local tape backup units of varying capacity. This model, while still common in municipal environments, is less than ideal. Managing different drive and media platforms is at best inefficient, particularly with significant growth in storage requirements. Standalone drives require IT staff to constantly monitor jobs and switch out tapes, which wastes time and increases the likelihood of human error. Major data restores also pose a significant challenge: shuffling dozens of tapes of varying capacities and platforms make a successful recovery from major failure a risky, time-consuming task.

Changes to the Town’s backup systems are addressed in [Recommendation 6](#).

## **Backup Power**

Backup power services in the Town’s server room are inadequate by most business standards. UPS’s, where found, are generally of the low-end ‘stand-by’ class and do not

provide the conditioning and voltage regulation characteristics essential to infrastructure stability.

Servers and network hardware are exposed to damage, and applications and data are exposed to corruption as a result of these inadequate facilities.

Backup power upgrade recommendations are addressed in [Recommendation 8](#).

## **Printing**

Depending on the application, printed output is produced on high-speed laser/multi-function devices that reside on the network, or on local desktop printers. Most production applications are served by the speed and efficiencies of the former, while convenience and occasional color output make the local printer most users' choice when printing from office productivity programs.

Based on observations obtained in this study, it is our opinion that local printers are over-utilized. Most are 'inkjet' printers that, while inexpensive to purchase initially, use costly consumables and are quite susceptible to failure. Networked laser printers and multi-function devices are, conversely, much more practical. They are more reliable, faster, and produce better output at a significantly lower cost-per-page.

Most of the network laser printers are over 7 years old and generally past the end of the business standard life cycle.

Printing system upgrades are suggested in [Recommendation 12](#).

## **VI. Security Structure**

For the purposes of this study, the Town's IT security structure will be assessed at three levels: network, application and client.

Network security includes protection measures deployed at the WAN and LAN level. Certain WAN, LAN and perimeter security elements have been addressed earlier in this report. Other pertinent conditions that exist on this level include:

- Network traffic is routed at all sites. This significantly improves overall security and performance.
- Security at the WAN/LAN level is governed primarily by the VPN Concentrator, which establishes secure tunnels for each remote location. IT staff has not received any training on this device and its services, and therefore relies extensively on the vendor (Unicom) for management and support.
- Most applications require their own username and password credentials for access. Direct access to data files is secured by rights granted at the network operating system level.

- Many desktop systems still use Windows NT Workstation operating system. This product has reached the end of its support cycle, and security patches are no longer being developed by Microsoft. This leaves these desktops exposed to new vulnerabilities and security holes that are discovered regularly. Elsewhere in this report, we are recommending that the Town adopt Windows XP Professional as its desktop client standard and Active Directory for its network authentication. This problem will be resolved if these recommendations are implemented.
- Users are free to browse web sites at their own discretion, and without proper protection, often do so at their peril. On-line screen savers and other utilities have created a number of performance problems, and IT staff is frequently called upon to address them.
- Protection from “Spyware” is not present on all desktop systems. Spyware is a relatively new problem for users who frequent the internet. Programs are silently downloaded from the internet without the users’ knowledge when visiting certain sites. Commonly referred to as ‘trojans’, these programs can present a number of different risks, including making your system vulnerable to outside attack. Spyware modules have been implicated in system problems also, including system slowdown, “Illegal Operation” errors, browser crashes, and even the “Blue Screen Of Death”. Since a spyware program is an independent executable program residing on the users’ PC, it has all the privileges of the user who installed it. On the majority of single-user systems, these privileges allow software to read, write and delete files, download and install other software, change the default homepage, interrogate other devices attached to the system, or even format the hard drive.
- The Town has deployed Microsoft ISA Server 2000 to provide perimeter protection for its Internet gateway. ISA Server is a multilayered firewall that, as described earlier, generally provides good protection against threats from the outside. It is configured to provide basic firewall services, such as NAT, web caching and packet filtering. Other features, such as access policies, intrusion detection and VPN have not been defined. The Town’s IT staff has limited knowledge of ISA Server and has relied extensively on outside vendors for the system’s maintenance and management. While some advancements have been made in the latest version of the product (ISA Server 2004), there are more comprehensive, integrated solutions that do a better job at serving the Town’s long-term needs.

Network Security is addressed in [Recommendation 10](#).

## **VII. IT Staffing**

The Town’s Information Technology department is staffed by a full-time IT Director, Joe Young, and a full-time technician, Tony Martel. These 2 individuals are responsible for the vast majority of the IT Assets noted in this report, which includes approximately 150 users in all Town locations. The Town has been operating with a 2-person IT Department for approximately 10 years. In that period, as is the case with any organization with reliance on Information Technology, the demands on the IT Department have grown substantially. Applications and technologies such as e-mail, Internet, GIS, Wide Area Networks, Local Area Networks, and Windows were in their infancy in the Town when the Department was expanded to 2 people. The implementation of some of the recommendations in this report,

while hopefully eliminating some of the challenges the Department faces, will require even greater technical skills and effort.

It Staffing is addressed in [Recommendation 9](#).

## **VIII. Municipal Software Applications**

We were requested to obtain an overview of the Town's use of Land Records and Financial Management Systems. Following is the result of our review.

### **Land Records**

In the Municipal market, Land Records typically involve systems pertaining to the majority of the activities pertaining to Land ownership and use, including Permit and License applications, tracking, issuance, inspections, and ancillary activities. While Property Valuation and Ownership records are very closely related to Land Records, they are typically maintained in separate (but hopefully fully-integrated) Property Appraisal Systems.

The majority of the Town's Land Records systems are only partially automated, and those records that are automated are primarily limited to the use of standard, basic office software (e.g., Excel, Access) . All of the following departments use these tools to varying degrees in automating the Permit, License, and related Land Records information that they are responsible for: DPW, Board of Health, Town Manager, Engineering, Town Clerk, Fire, and Planning.

The Assessors Office record Permits into the Patriot Properties Appraisal. This is the only Department that uses a Municipal-specific application for Land Records, but, by virtue of the fact that this office is not as involved in most true Land Records activities as the departments listed above, the use is very basic.

The Harbormaster uses a custom developed (SQL Server) application for mooring records, daily logs, etc. The Collector's office also uses this application to record mooring fees.

While we were not requested to review any of the above systems and records in any detail, our experience suggests that it is likely that there is some redundancy between the above systems with respect to common information, as well as some inconsistencies. For example, it was pointed out to us that most departments use different methods to identify parcels. This will be one of the many policy and procedure issues that will need to be resolved if the Town is to move forward with a true Land Records System.

Although the above departments obviously have implemented Land Records automation to some degree, the majority are not fully automated and therefore manual procedures and records are still utilized.

With the exception of the Harbormaster/Collector's integration, none of these departmental systems are integrated with each other. Such integration would greatly benefit those departments who frequently need to track the land records activities of other departments.

Many Land Records activities result in the collection of fees. While some of these fees may be recorded in the systems mentioned, there is no integration with the Town's Financial Management System. Such integration could not only streamline the fee collection process, but also benefit the Permit/License application process in order to determine if applicants owe money to the Town.

As one would expect, the basic level of automation currently utilized for the Town's Land Records does not include Web-based functions of any kind. It is not unreasonable to expect state-of-the-art Land Records applications to provide for on-line applications, payments, tracking, and related Land Records activities.

Land Records are addressed in [Recommendation 16](#).

### **Financial Management System**

The Town's Financial Management System was purchased from DataNational Corp. (DNC). It includes the following applications:

Accounting – General Ledger/Budget, Accounts Payable, Purchase Orders

Tax Billing and Collection – Real Estate, Personal Property, Excise

Utility Billing and Collection

Treasurer's Cash Receipts

Although DNC does provide a Payroll module, it is not used by Plymouth. An out-sourced product is used (Harper's Payroll).

The system has been in use in Plymouth for approximately 5 years. It is a Unix-based system based on what would be considered today as relatively obsolete character-based technology and a proprietary database. DNC has recently announced a new direction for some of its Accounting applications, and also now provides Windows-based Tax and Utility Billing applications. Although the vendor's plans for the current version of the system are not known at this time, it is reasonable to expect that the new direction will likely lessen the vendor's commitment to the current system over time.

DNC is a fairly well-established provider of Municipal Software in Massachusetts. However, the Town has become increasingly frustrated by some functionality and support issues. Apparently, several other MA customers share the same frustration, and some have already switched to new systems.

The Accounting modules are used by both Town and School in a fully-integrated fashion. The School Administration Building has remote access to the DNC Server that is located at Town Hall. Although the system appears to be capable of allowing distributed access to the Accounting system, the School Department is apparently the only Department that

performs this function. All processing for all other Departments is performed by the Purchasing and Accounting Departments at Town Office.

The DNC system seems to be performing many basic functions at an acceptable level. Some of these functions include vendor warrants, tax and utility bill production, monthly reconciliation support, Treasurer's cash receipts, payment processing from lock box and mortgage companies, and integration of tax refund processing with Accounting

The School Department is very satisfied with the Accounting modules. A fairly significant amount of effort was invested in adapting the system to the School Department's needs during the implementation period. While the satisfaction level was not high soon after the implementation period, additional upgrades and adaptation on the part of the School Department eventually brought the system to its current level of satisfaction.

Regarding overall system features, some of the limitations appear to be in the following areas, in that these functions are either non-existent or fairly limited:

- Data export to Office applications (some reports can be exported to Excel, but there is not a direct data export capability)
- Report Writer
- Ad-hoc Queries
- Image-enabled (e.g., GIS)
- Forms design software
- Web-enabled functions

Regarding additional applications that the Town would likely benefit from, the current DNC system does not include the following modules:

Requisitions

Fixed Assets

Work Orders

General Billing

Project Accounting

As a result of our limited interviews with the Town users of the system, following are what appear to be the key functional issues that are lacking in the system:

#### **Utility Billing**

- There have been problems with Consumption Reports and compound meters.
- Final Reads need to be done manually
- Making corrections to readings is more complicated than it needs to be

- Some or all reports can't be run while others are doing File Maintenance on related data
- Does not handle cross-connection charges. Also, Fire service demand charge will have to be billed manually.
- % consumption variances are not flagged
- Does not include a Meter Inventory component

### **Accounting**

- The System does a poor job of flagging over-expenditures
- Until the current month is closed, invoices for the following month cannot be entered
- The Budget Development module does not automatically roll forward from one budget level to the next. It also does not provide a "what-if" capability
- Unless the voucher number is the same, multiple invoices for the same vendor do not get paid via one check

### **Purchasing**

- Purchase Orders are accessed via Account Number vs. PO number, often requiring multiple screens to be accessed in order to see an entire PO
- If a PO needs to be changed, the change has to be manually calculated first
- A history of PO changes is not maintained
- Open PO reports are cumbersome
- Once a vendor is attached to a PO, changes to that vendor record do not affect the PO
- Vendor records cannot have multiple remittance addresses
- Due to field size limitations, there is too much abbreviation required for names, descriptions
- Project tracking is very limited, and due to these limitations the Town purchased a separate Project tracking module
- Searching for PO's of a prior year requires the knowledge that the PO was in fact issued in a prior year
- It is difficult or impossible to delete vendor records, even if there have been no payments.
- The 1099 process is very inflexible

### **Accounts Receivable – Tax and Utilities**

- The Treasurer's component of Tax Title does not work well; Excel is used instead
- There is no Central Customer file or integrated receivables by customer
- The MLC function does not provide for an archiving feature or for Attorney's fees
- The payment scanning feature seems to only work for Excise
- Although DNC claims to support it, on-line (web-based) payments are not utilized
- Harbor Master billing functions are done outside of DNC
- There is no Central Parcel File. If incorporated with Land Records, this would greatly assist in linking all Land Records data with Receivables and Customer data.

Financial Management Systems are addressed in [Recommendation 17](#).

## RECOMMENDATIONS

Based on the findings of this study, we recommend the Town consider the following changes as part of its effort to improve the security, stability and performance of its IT infrastructure and applications.

These suggestions vary significantly in breadth and detail. Most will require outside assistance and a detailed deployment project plan.

All share the following characteristics:

1. All will promote improved levels of security, stability and/or performance in its IT infrastructure.
2. Each leverages existing elements where possible.
3. All are scalable, foundational elements of a long-term strategic IT plan.

The recommendations are listed in a general order of priority. Specific tasks or steps required to complete each objective are not provided. Costs for project planning and product specification (if applicable) are not included.

Cost estimates are summarized in spreadsheet form in [Attachment 3](#).

### 1) WAN Upgrade

The Town should decommission all Adelphia and dial-up segments and replace them immediately. There are several possible solutions, each offering varying degrees of cost, performance, scalability. They include managed 3<sup>rd</sup> party services (e.g. Verizon's Frame Relay), fixed broadband wireless and private fiber optic cable.

Based on the Town's geographic size, economic constraints, long- and short-term needs, we believe that the best solution would be a combination of fiber optic and wireless segments.

It should be noted that our recommendation is general in scope and based on our limited WAN study. This was noted in our Proposal. While we are confident in the general direction and configuration of the recommendation, a more comprehensive analysis should be conducted prior to implementation. As previously noted, with the exception of its use of the Financial Management System, the School Department was not included in this Study. However, it would be prudent to include the School Department in a complete Wide Area Network Study, with the understanding that the resulting analysis will produce a cost estimate that is greater than the one provided herein.

Fiber optic cable is an established technology and offers the highest levels of performance, security, reliability and ability to support current and future technologies. Costs are driven by segment distance and customer premises equipment used to drive the communications.

Wireless broadband is an emerging technology, and although it cannot match fiber in any of the factors mentioned above, recent advancements have made it a very attractive alternative in certain conditions (e.g. remote single-user/small network environments that must participate on the WAN over a long distance.)

We recommend that distant remote locations (i.e. Fire Stations 4,5,6, Emergency Prep and the Manomet Library) be serviced by wireless links. If, however, it becomes possible to create fiber segments to these sites without substantially exceeding the total WAN cost estimate provided herein, we recommend that the Town consider doing so. In any case, all other locations should be connected to the WAN by fiber.

The WAN's core will be located at the Town Hall in the current server room. All fiber links will originate from the core.

Fire Station 3, located near the Town's high-point, will serve as the "head-end" for all wireless links.

All fiber and wireless installations must conform to national, state and local codes. Exact specifications will be developed in a subsequent study. All work and materials must come with a minimum of one-year warranty from the vendor. Extended annual maintenance or emergency restoration services should be negotiated with the vendor as well. The Town may opt for a Time & Materials arrangement or a set monthly fee covering all possible problems. We estimate the range of these fees to be **\$20,000-25,000** per year.

Given Verizon's estimate of \$150-200k per year for its Managed Frame Relay services (the viable alternative to fiber/wireless solution), the Town will see 'break-even' in 3-4 years. With only maintenance fees and future hardware upgrades to consider from that point forward, the Town will save well over \$100,000 per year while enjoying the benefits of the top performing WAN technology available today.

We estimate the cost for this solution, including materials and installation charges, to be \$600,000.00.

Description	Estimated Cost	Notes
Fiber Segments	\$550,000	
Wireless Segments	\$50,000	
<b>TOTAL</b>	<b>\$600,000</b>	

Due to the fact that these estimates have not been based upon a detailed study, please note that they are based on the following assumptions that have been conveyed to us by the Town: The Town will be granted access to sufficient space on all required utility poles at no cost; where necessary, the Town will be granted access to existing conduit at no cost; all fiber connections to each building will either be aerial or through existing conduit; the WAN vendor will be able to connect the fiber to a Main Distribution Frame (MDF) in each building without incurring additional construction costs to create a re-locate the MDF.

Although this Study is not intended to address voice communications, we would like to make the following brief comments. If the Town does adopt the fiber WAN solution, we

recommend that it consider replacing its existing legacy voice systems with an integrated IP telephony solution. This technology has reached the mainstream and is now widely deployed in the public sector. By eliminating costly recurring phone company charges and greatly simplifying adds, moves and changes, IP has established itself as an excellent business value.

With a private fiber network and new Cisco switches built to support its IP telephony solution, the Town would be very well positioned to adopt it.

**2) Core and Remote Network Upgrades**

In order to support the new WAN communications mediums, the Town should upgrade all core and remote network equipment. With most of this equipment obsolete and out of warranty, its replacement would soon be necessary regardless of the chosen WAN transports.

Included in these upgrades will be a new core switch, which will serve as the point of origin for all fiber links (1 Gigabit-per-second) to remotes via single-mode long-haul GBICs. It will also provide 10/100/1000Mbps copper links to all Town Hall servers and desktops. This switch will replace all existing hub and switch equipment currently in place in the server room.

Remote sites will have one or more 10/100/1000Mbps edge switches installed to support all users. Switches at fiber-based locations will have a GBIC port to provide connectivity to the WAN. Those supported by wireless links will have 100Mbps copper uplinks to wireless communications equipment.

We recommend that all new switch equipment support for Layer 3 switching, PoE, management and converged services (video, Voice-over-IP, etc.)

In addition to new switch equipment, we recommend that the Town install a new rack enclosure at the Town Hall server room to support the new switch and other equipment. Racks should also be installed at DPW, Fire HQ, and Library if necessary.

The estimated cost for product and installation is \$97,000.00.

Description	Estimated Cost	Notes
Hardware	\$91,000	
Services	\$6,000	
<b>TOTAL</b>	<b>\$97,000</b>	

**3) Upgrade Internet Connection**

We recommend that the Town take advantage of the deployment of its new fiber network and extend it directly to a 'Tier 1' carrier, thus establishing gigabit Ethernet connectivity to the internet.

Our preliminary assessment has determined that a majority of the cost associated with the installation this segment can be included in the WAN upgrade. There will be monthly fees from the carrier, however, which we estimate to be \$1500.00 per month.

If this link is established, the Town may want to also examine the possibility of offering access to this service to the School Department.

If the Town chooses to do so, they will have over 100 times the bandwidth to the internet available for roughly the same cost as the T-1 and T-3 currently in place. The Town may also break out channels in this circuit to support IP telephony, which would offer more significant savings.

Specifics for planning and implementing this solution can be developed by the vendor chosen for the WAN upgrade project.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Fiber Internet Segment	\$10,000	
<b>TOTAL</b>	<b>\$10,000</b>	

#### **4) Server Replacement**

With some servers beyond their useful life and out of warranty, we recommend that the Town immediately adopt a Server Replacement Plan.

Changes in applications and technologies, as well as opportunities for consolidation make server replacement planning difficult, but not impossible. As a general rule, most server hardware becomes obsolete after 4 years, and extending its use, maintenance and warranty beyond this point is usually impractical.

We have detailed our replacement recommendations in the Server Replacement Matrix attachment.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Servers	\$132,000	
Services	\$33,000	
<b>TOTAL</b>	<b>\$165,000</b>	

#### **5) NOS Migration**

Support for Windows NT Server has already ended. Microsoft's support cycle for Windows 2000 Server ends in June, 2005.

Upon completion of the WAN upgrade, the Town should upgrade its core network operating system (NOS) from Windows NT/2000 to Windows Server 2003 and deploy related services, including Active Directory.

During this migration, we recommend that the Town move to a single domain model. This will eliminate the need to manage multiple domains and server hardware. Depending on security requirements, the Police may be excluded from this domain consolidation.

This task is essential to the long-term stability of the Town's critical systems and functions. The completion of this process will require knowledge and experience beyond that which the Town's IT staff currently possesses.

Town IT staff is capable of performing some configuration changes that may be required at some desktop systems. The cost for outside services to perform this task is not included below.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Software	\$6,000	
Services	\$3,000	
<b>TOTAL</b>	<b>\$9,000</b>	

**6) Deploy a new Tape Backup System**

We recommend that the Town purchase and a new tape autoloader and implement a centralized tape backup system. The new system will replace all existing independent backup services.

This system will save the Town time and financial resources, and reduce its vulnerability to failed recovery in the event of major failure. Industry estimates for the operation of standalone backup systems are roughly \$.10 per megabyte, while autoloaders typically cost \$.01 per megabyte. The cost for including standalone drives and media for all servers would likely exceed \$20,000 over the next 3 years, not including the cost of staff time to operate them.

We recommend that the Town purchase the latest tape backup software to support this device.

We estimate the cost to deploy this solution to be \$9,500.00.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Tape Library & Software	\$8,000	
Services	\$1,500	
<b>TOTAL</b>	<b>\$9,500</b>	

**7) Consolidate E-Mail Services**

The management of multiple mail servers will no longer be necessary after the WAN upgrade and domain consolidation is completed. We recommend that the Town purchase and implement Microsoft Exchange Server 2003, decommission mail servers located at the Library and Fire HQ and consolidate all mail services. However, the Town may also want to investigate outsourced, managed services for e-mail.

The Town will save approximately \$30,000 in hardware, software and services over the next 3 years through this consolidation.

New server hardware will be acquired as part of Recommendation 2.

We estimate the cost for implementing this solution to be approximately \$13,000.00.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Exchange 2003 & CALs	\$8,000	
Services	\$5,000	
<b>TOTAL</b>	<b>\$13,000</b>	

**8) Upgrade Power Protection**

We recommend that the Town purchase and install the power protection equipment necessary to support all new server and network hardware located in the Town Hall server room.

Based on our preliminary assessment, we estimate costs for these improvements to be approximately \$10,000.00.

We recommend that the Town take advantage of American Power Conversion’s free assessment to identify exactly what products should be purchased.

<b>Description</b>	<b>Estimated Cost</b>	<b>Notes</b>
Hardware	\$8,000	
Services	\$2,000	
<b>TOTAL</b>	<b>\$9,500</b>	

**9) Supplement and Train IT staff**

There is clearly a need to improve the level of the Town’s IT support, and we recommend that the Town take measures to do so. This will require training and additional resources, and thus will affect the Town’s annual recurring budget (as opposed to capital improvements.)

Assuming the majority of the recommendations in this report are to be implemented, the next 1-2 years will be years of transition for the IT Staff. Outside technical assistance will likely be used to assist in the transition. In that process, the staff will be learning some new technologies in a “hands-on” fashion. Nonetheless, formal training in some technologies will be required. We recommend that the Town provide a minimum of \$10,000.00 for training its IT staff for the upcoming year. The Town should also plan on budgeting this sum annually for training in the future.

As noted, the Town has been operating with a 2-person IT Department for approximately 10 years. Although some of the current demands on the time of the Staff will be eased

with the implementation of some of our recommendations, there will be new demands that will occur. We believe the time has come for the Town to consider providing additional resources, either by hiring another full-time staff member or through outsourced services. Both of these alternatives have pros and cons, and the Town should investigate both options in order to determine what is in its best interests for both the short-term and long-term. We would also like to reiterate that this report did not include a review of Town GIS requirements and therefore our comments about the need for additional IT staffing resources are exclusive of GIS staffing needs.

In order to address its increased IT staffing needs, we recommend that the Town add \$55,000 per year to its operating budget.

## 10) Deploy New Network Security Systems

The Town must protect its systems from increasing threats such as access breaches, worm attacks, viruses, internal threats and other malicious traffic and applications. Symantec Anti-virus Corporate Edition has been deployed recently and will mitigate virus infections substantially. Full-time connection to the internet subjects the Town's network to other risks and vulnerabilities, however, and while ISA Server is relatively effective at combating these threats, we recommend that the Town purchase and deploy an enterprise level solution to complement (or possibly replace altogether) the ISA Server.

One highly effective solution is Cisco Security Monitoring, Analysis and Response System (CS-MARS). This system is sophisticated and will require some IT staff training for effective management, but we believe it will be an excellent complement to existing security systems and serve the Town's security needs for the foreseeable future. There are outsourcing options available for this, but no recurring costs and a relatively low total cost of ownership make this solution very attractive. In addition to spyware and adware detection, this system will protect the Town's network from policy violations, vulnerability exploitations, and other suspicious activities.

Based on our examination of the Town's network traffic patterns, we would recommend the CS-MARS 50, which is capable of handling 1000 events per second. There are a number of different deployment options in this system, however, and we recommend that the Town choose a Certified Cisco Partner to assist them with the proper configuration.

The estimated costs for deploying the CS-MARS 50 solution is \$21,000.00.

Description	Estimated Cost	Notes
Hardware/Software	\$15,000	
Services	\$6,000	
<b>TOTAL</b>	<b>\$21,000</b>	

## 11) Establish a PC Replacement Plan

Although assessment of PC hardware was not included in this study, we have concluded from discussions with Town staff that a PC replacement plan should be adopted as soon as possible.

It is our recommendation that the Town plan to replace PCs on a 3-year cycle. The Town should choose a single vendor from the MA State Contract ITC05.

We recommend LCD flat-panel displays. They are easier on the eyes and have come down significantly in price. Hardware requirements vary depending on the applications used. We recommend that the Town adopt the following minimum desktop PC standards (valid through FY06):

Standard User:

- Pentium 4, 2.4Ghz, 512MB RAM, 40GB hard drive, 10/100NIC

Power User:

- Pentium 4, 3.8Ghz, 1GB RAM, 80GB hard drive, 10/100NIC

Starting with FY06, we recommend replacing 50 PCs per year at a cost of approximately \$62,500.00 annually. From FY09 forward, the Town should include PC replacement costs in its operating budget. Users with less demanding performance requirements should be classified as 4- or 5-year replacement candidates, thus allowing for additional resources to be directed toward power users.

Description	Estimated Cost	Notes
PC hardware	\$150,000	
Services	\$37,500	
<b>TOTAL</b>	<b>\$187,500</b>	

### 12) Upgrade Network Printers

We recommend that the Town replace all obsolete network printers over a 3-year period.

We estimate the first-year costs to be \$15,000.00 for this project.

Description	Estimated Cost	Notes
Printers	\$32,000	
Services	\$8,000	
<b>TOTAL</b>	<b>\$40,000</b>	

### 13) Standardize office productivity software.

Mainstream support for Office 2000 and earlier products ended in June 2004. Extended (fee-based) support for Office 2000 will be available through 2009.

We recommend that the Town standardize on Microsoft Office 2003 for its office productivity software.

The Town should include Office 2003 with all new PC purchases. Office upgrades should be done on systems that are not scheduled to be replaced this year.

We recommend that the Town utilize outside services to assist in this deployment. Options include Image Management services (direct installation by the chosen PC hardware vendor) or custom installation services by outsourced technicians. A third option worth noting is the purchase of drive duplication hardware, which would allow IT staff to create custom drive images and deploy them to new and existing systems.

We estimate the cost of this project to be \$75,000.00.

Description	Estimated Cost	Notes
-------------	----------------	-------

MS Office 2003 Licenses	\$45,000	
Services	\$30,000	
<b>TOTAL</b>	<b>\$75,000</b>	

**14) Purchase IT asset management and help desk tools**

We recommend that the Town purchase and deploy tools that will assist its IT staff with improving the level of service the department provides. There are a number of effective help desk and asset management utilities, such as Intuit's *Track-It*. Microsoft's Technet is a CD-based monthly subscription that includes a complete and current source of Microsoft technical information on evaluating, planning, deploying, managing, supporting Microsoft business products.

Effective deployment of the asset management software may require outside assistance. The Town's IT staff is fully capable of installing Technet.

Description	Estimated Cost	Notes
Software	\$10,000	
Services	\$2,000	
<b>TOTAL</b>	<b>\$12,000</b>	

**15) Rework data storage model**

We recommend that the Town redesign its data storage model for both its production application and office automation data. A streamlined structure with established standards that apply to all users will allow for more practical backups, efficient use of storage resources, better capacity planning and easier data recovery.

While this process is not usually complex, it is time consuming. Town staff should research best practices, design the model and move data to the new structure as time permits.

**16) Implement a Land Records System**

The Town could greatly benefit from an automated Land Records System that will serve the needs of all Departments involved in Land Records activities in a truly integrated fashion, as well as the general public. Some of the capabilities of this system should be the following:

Based upon a centralized parcel database that is updated frequently from the Town's existing Appraisal system.

A flexible workflow component that will allow each department to define its own sequence of activities that are required for Permit and License issuance.

The ability to customize all required Permit and License forms, as well as other required forms.

The ability for Citizens to conduct Land Records business with the Town on-line, including applications, tracking, and payment.

The ability to integrate with the Financial Management System for 2 major purposes: Determination of amounts owed by applicants or parcels prior to issuance of Permits, and for the recording of various fees.

The ability to share all required information with any department that needs it.

GIS integration as well as the ability to produce abutters lists.

Ability to schedule inspections.

Ability to support handheld devices that are used to record field inspections.

The system should also be based on current technologies, including an industry-standard relational data base, Client/Server support, and support for Browser-based interfaces

As noted above, the Land Records System should ideally be fully integrated with the Town's Financial Management System. However, not all providers of Land Records Systems can also provide Financial Management Systems. The Town should investigate Land Records Systems that are integrated with Financial Management Systems as well as those that are not and make a decision based on all factors. We are recommending that the Town begin to implement a Land Records System in FY06 and a Financial Management System in FY07. However, given our preceding comment about the need to investigate a fully integrated Land Records and Financial Management System, the investigation of such a system will need to be conducted in FY06. Therefore, prior to the selection and implementation of any Land Records system, the Town should have already made an informed decision as to whether or not it will implement a fully integrated Land Records and Financial Management system.

Our estimated cost for a Land Records System is \$175,000. This includes software, implementation, and training services. Annual costs for software support and maintenance are estimated to be \$15,000. It also includes \$15,000 in preliminary consulting services regarding the investigation of Town requirements and available systems.

Finally, if a new Land Records System is to be implemented, some consideration should be given to an approach referred to as ASP (Application Software Provider). With this approach, as opposed to installing and operating the System via Town IT assets, the software and data will reside at the location of the Software vendor, and the vendor will be responsible for maintaining and supporting the system (including back-up services) at their location. In this case, rather than paying up-front costs for software and services, the Town will pay an annual fee for the system. It is estimated to be \$40,000 per year. This does not include the one-time cost of \$15,000 for preliminary consulting services associated with investigation of Town requirements and available systems, which we have previously estimated to be \$15,000.

#### **17) Implement a new Financial Management System**

The Town should upgrade to a new, State-of-the-art Financial Management System. The system should obviously resolve all of the issues noted in this report, as well as include all of the lacking functionality and modules noted in this report. As mentioned above, it is desirable to implement a Financial Management System that is fully integrated with the

recommended Land Records System, but this may not be possible. The system should also be based on current technologies, including an industry-standard relational data base, Client/Server support, and support for Browser-based interfaces

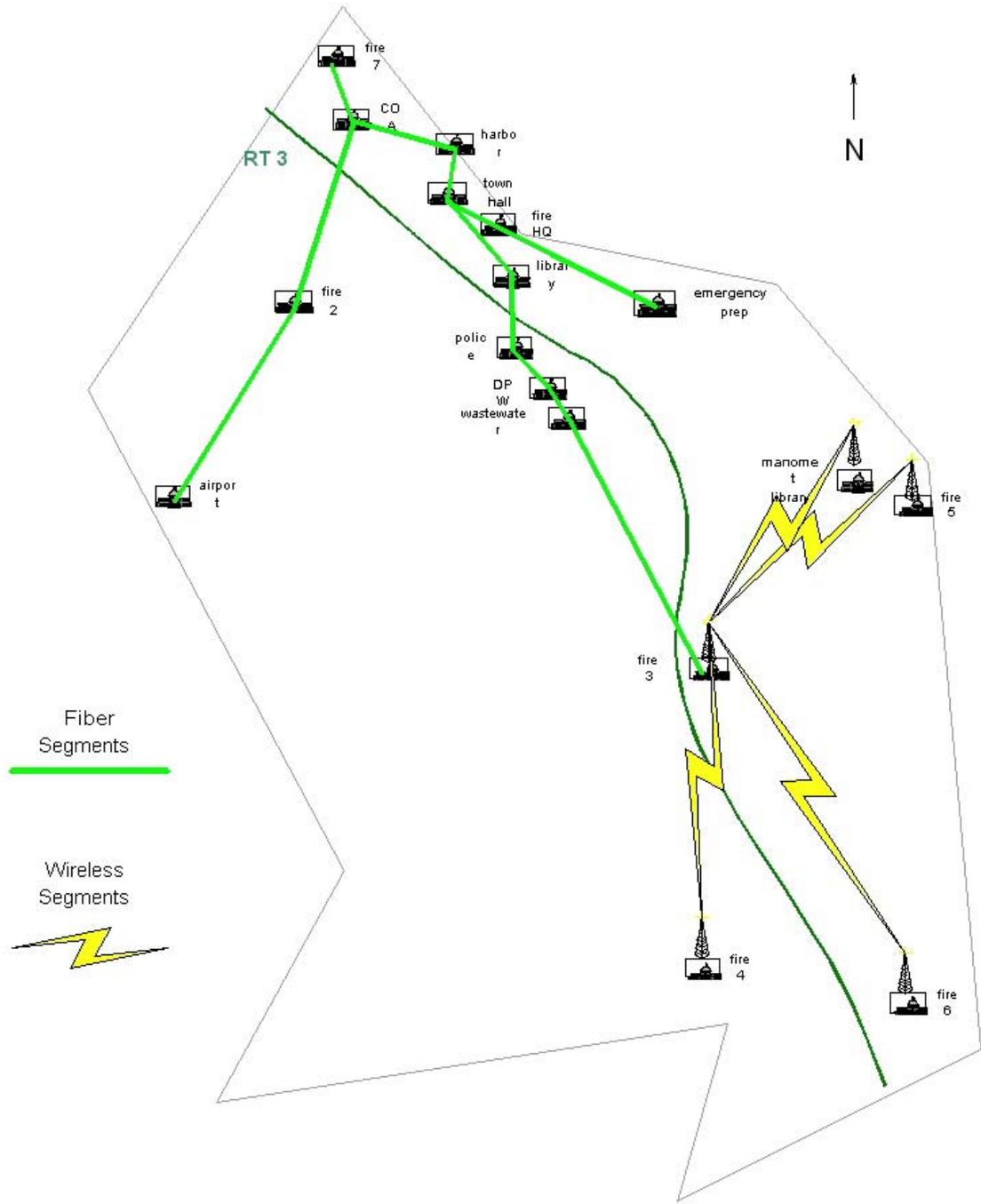
Our estimated cost for a new Financial Management System is \$875,000. This includes all software, implementation, and training services. It also includes \$45,000 for outside Project Management Services regarding system implementation. Application software modules included are General Ledger, Budget, Project Accounting, Requisitions, Purchase Orders, Fixed Assets, Tax Billing and Collection, Utility Billing and Collection, General Billing, Miscellaneous Cash Receipts, Treasury Management, and Work Orders. Application software modules not included are Payroll/Personnel and Inventory. Annual costs for software support and maintenance are estimated to be \$150,000. These costs pertain primarily to application software support and do not include optional services (e.g., Disaster Recovery) that may be offered by some vendors.

Please note that the above costs assume that both the Town and School Department will move forward with the implementation of a new system. If only the Town, and not School, is to move forward with a new system, these costs will be substantially less.

As with the Land Records System, the Town may also want to consider the ASP approach for the Financial Management System, the cost of which is estimated to be \$475,000 per year. This assumes the system will be used by both Town and School, and includes all annual support and maintenance. It does not include any one-time costs for outside consulting services pertaining to Implementation Project Management services, which we have previously estimated to be \$45,000.

## **ATTACHMENTS**

# Wide Area Network Map



## Server Replacement Matrix

Server Name	OS	Applications	Configuration	Replace	Cost
<b>Town Hall</b>					
COM1-THALL	Win2k	Ex.5.5, DHCP, RAS, IIS	Compaq ML370, 2.4Ghz, 1GB RAM, 90GB HD	2006	20000
OA2-THALL	Win2k	PDC, WINS, F&P		2008	15000
FINANCIAL MGMT.	Unix	DNC		2007	15000
CAD-THALL	Win2k	Autocad & ArcInfo GIS	Dell Poweredge 2500, 1GB RAM, 70GB HD	2007	15000
ASSESSOR	NT4	DNS, Patriot Properties	Dell Poweredge 2500, 512MB RAM, 34GB HD	2007	15000
ISA1-THALL	Win2k	ISA, Web proxy, Gateway	Compaq ML350, 2.2Ghz	2007	10000
GIS2-THALL	Win2k	BDC, Payroll Server, Small SQL databases		2008	15000
New LAND Records	Win2k			2006	15000
<b>Library</b>					
OA1-LIBRARY	NT4	PDC, F&P, WINS, Ex.5.5	Compaq Proliant 2500, 200Mhz, 98MB RAM, 2GB HD	2006	15000
<b>Fire</b>					
OA1-FIRE	NT4	PDC, F&P, WINS	Compaq Proliant 2500, 200Mhz, 163MB RAM, 8GB HD	2007	15000
OA2-FIRE	Win2k	Ex.5.5	Dell Poweredge 2500, 512MB RAM, 70GB HD	2007	15000

## Project Cost Summary

Description	Project #			Total
	2006	2007	2008	
WAN Upgrade	1			
				\$600,000
				\$0
				\$0
			\$600,000	
Core and Remote Network Upgrades	2			
				\$97,000
				\$97,000
Upgrade Internet Connection	3			
				\$10,000
				\$10,000
Server Replacement	4			
				\$50,000
				\$85,000
				\$30,000
			\$165,000	
NOS Migration	5			
				\$9,000
				\$0
				\$0
			\$9,000	
New Tape Backup System	6			
				\$9,500
				\$0
				\$0
			\$9,500	
Consolidate E-Mail Systems	7			

		\$13,000
		\$0
		\$0
		\$13,000
	8	
Upgrade Power Protection		\$10,000
		\$0
		\$0
		\$10,000
	10	
Deploy New Network Security Systems		\$21,000
		\$21,000
	11	
Establish a PC Replacement Plan		\$62,500
		\$62,500
		\$62,500
		\$187,500
	12	
Upgrade Network Printers		\$15,000
		\$12,500
		\$12,500
		\$40,000
	13	
Standardize Office Productivity Software		\$75,000
		\$0
		\$0
		\$75,000
	14	
Purchase IT Asset and Help Desk Tools		\$0
		\$12,000
		\$0
		\$12,000
	16	
Implement a Land Records System		\$100,000
		\$75,000
		\$175,000
	17	
Implement a new Financial Management System		\$0
		\$875,000
		\$0
		\$875,000

**Total**

**\$1,072,000**  
**\$1,122,000**  
**\$105,000**  
**\$2,299,000**

Add: Project Planning/Consulting Services

\$30,000  
\$10,000  
\$5,000  
**\$45,000**

Grand Total

\$1,102,000  
\$1,132,000  
\$110,000  
\$2,344,000

**Estimated Annual Costs**

Internet Access (gigabit Ethernet)	\$18,000
Virus and Spam Prevention updates	2,000
IT Training	10,000
IT Staffing	55,000
Land Records software support	15,000
Financial Management software support	150,000
WAN Maintenance	25,000
TOTAL	\$275,000