Information Technology Department
Master Technology Plan FY 05/06

FY05-06 Master Technology Plan Update
Part I

Over the last two to three years the Information Technology Department (ITD) has been documenting the Marshfield Computer systems and Infrastructure. With all of the departments supplying insights to the needs of their departments and the goals of ITD to reduce spending while improving services, ITD has set out to supply a Master Technology Plan for this purpose. Marshfield IT Coordinator and select external vendors collaborated to comprise this document for purposes stated.

This first pass at a living document came in FY06 and supplied ITD with a template to reach the goals of all departments in an integrated fashion through smart technology planning and adoption. As you read through this document you will see detailed timetables for many aspects of the IT deployments going forward. This document will be visited every two years and updated to allow for the changes in technologies and advancements that Marshfield adopts.

Built into this document are details regarding the current infrastructure and the thought process used to make decisions for upgrades, as well as hardware and software conversions. Cost factors and ROI are also discussed when available. The latest figures for Staffing, support cost and implementation cost are also brought to light.

Support of these initiatives in the form of staffing and funding is imperative if Marshfield is to move into a computing environment which operates in collaboration of all processes through out all departments.

Master Technology Plan Updates for Fiscal Year 07/08 will be posted in late Fiscal 08.

Respectfully
Ron P Menard
I.T. Coordinator
Marshfield, MA.

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INTRODUCTION

In accordance with the Town of Marshfield's Information Technology Initiatives, the following proposed plan details the ITD's observations over the last two years, and the recommendations which the Information Technology Department will support for purposes of initiating a Master Technology Plan and the building of these technologies to meet the plan's goals. It includes several recommendations to improve the Town's IT infrastructure, applications and services over the next three to five years, for a total cost of $1.3 million dollars. Estimated ITD annual operating cost recommendations are $325,000.

The school's IT infrastructure was included in the Master Plan where applicable, and when the ability to mesh services and leverage each department's strengths was beneficial to the mutual sectors. This approach typically impacted the Town's infrastructure with regards to connectivity and application availability.

Not included in this Plan were the schools minute figures, representing the schools PC's, servers and software applications. Currently, the Marshfield School System and other remote departments have limited access to the Town's Payroll and Financial Systems as well as Marshfield's GIS. The School Department, with the exception of its use of the Town's Financial Management System and GIS, has begun to partner with the Municipal sector for testing of joint infrastructure sharing. Therefore, the study focused on General Government IT infrastructure with some specific details where applicable.

OBSERVATIONS AND ANALYSIS

I.   WAN

<u>Description</u>

The absence of a Town WAN requires many locations to operate over frame relay circuits which have yearly recurring cost totaling more than $78,000.00. The following sites utilize this connected infrastructure.

- School Administration Building

- High School

- Middle Schools

- Elementary Schools

- Alternative Schools

- Emergency Response Bldgs.

- Town Hall

Town buildings have a lack of connectivity between buildings creating gaps in communication flow and an inability to supply needed data and voice transmission between sites. The current sites listed above have dedicated Frame Relay circuits in the form of T-1 with 768/384 Kbs. The interconnected sites reside primarily for the schools usage, supplying data and VoIP packets to most remote locations. For purposes of this document, the school administration building is considered the host location. With the lack of a WAN backbone, communications on the Municipal side fall far short of the required bandwidth for Financial Management and GIS applications. The primary connectivity derives from 1) VPN (virtual private network), Dial up and Broadband services.

Buildings using the Adelphia network are connected by SurfBoard cable modems, which the carrier states are capable of providing 6 Mbps of bandwidth. Links between the remote sites and Town Hall are established over a VPN connection, controlled and authenticated on Town Hall's firewall. Connections are problematic and unreliable while attempting to use applications requiring dedicated bandwidth. This network is provided at a discounted rate for few locations as part of Adelphia's cable agreement with the Town. The town's agreement with Adelphia also included the supplying of an I-Net which included a dedicated channel that the town's communications network would use. This was removed and never rebuilt when Adelphia replaced its coaxial cable with dark fiber. Through litigation, the Town of Marshfield received an award for purposes of building its own infrastructure which the town is currently involved with.

Town locations with broadband cable services provided are: Airport, Library, COA, MEMA, Police and Fire, with additional connectivity for the Police department to access the Crime database over a dedicated 56Kbs frame circuit. Dial-up modem links are also used for purposes of connecting to Financial Management applications. These links are established, maintained and secured internally by a UNIX server and Microsoft Remote Access Server.

Stability

Due to a number of performance issues, Adelphia's network has not been utilized for mission critical processes. This lack of usage stems from the lack of business class support supplied by Adelphia, the inability to supply dependable bandwidth requirements, and a support structure that does not meet Marshfield's requirements. Other issues include:

- Adelphia's inability to return calls for service request and general documented support questions.

- Adelphia's proclaimed business model which does not include support of business class applications or connectivity. With links commonly unmanaged by the provider, the ability to utilize this medium as a failover for connectivity is not recommended.

The Town has been forced to implement inefficient and in some cases impractical solutions for purposes of dealing with inadequate connectivity mediums. For example, the Town supports multiple domains and e-mail servers at critical remote sites to compensate for the lack of a single WAN infrastructure. In a stable environment, one domain and one or two mail servers operating over a Routable network would be a much more practical and manageable solution. Certain needs and considerations may break this thought process, such as security, availability, and lack of redundant systems.

After consideration of this processes, hardware and connectivity methods currently in place, the most significant technical impediment the Town falls to, is its inability to provide business class connectivity for purposes of building an infrastructure inline with the availability of today's technologies.

Performance

While Marshfield's use of Adelphia's broadband is primarily for internet access the slow performance and packet loss of some remote connections have caused failures when utilizing the GIS remotely. Based on performance issues, it's quite likely that the actual bandwidth amounts are only a small percentage of the Maximum 2Mbps allocated and can fluctuate erratically at any given point.

Given current utilization loads, the Adelphia network does not provide acceptable performance, support or scalability to continue its use as a primary medium. Based on average growth rates for bandwidth demand, performance problems will increase.

Even with optimal compression rates and ideal environmental conditions, dial-up communications also fall short when providing adequate performance for most of Marshfield's software applications.

<u>Security</u>

Security within Marshfield's domains varies depending on the domain. Security is achieved in a number of instances while utilizing any number of technologies. Due to the sensitive nature of this topic, generalities are used to describe the current system. In some scenarios third party firewalls are in place to regulate and authenticate traffic. In other locations, NAT, combined with Microsoft's ISA server are used to secure the domain. In other locations, a combination of these measures and State-full packet inspection is used.

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

<u>Service and Support</u>

Adelphia offers the Town of Marshfield support, but is often ineffective with regards to supplying its customer a timely resolution. Many calls have been escalated to multiple parties before finding a qualified technician who can see the problem through to resolution.

The Town maintains its own modems and RAS servers for dial-up links. Line problems are serviced by Verizon and are resolved through normal provider support channels. This holds true for all T-1/PTP lines.

II.   LANS

<u>Description</u>

Local area networks (LANs) exist in the Schools, Town Hall, Police, Fire and Water Treatment facility, Library and COA. 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.

<u>Cabling Systems</u>

Twisted-pair copper cabling systems (Category 5 or 5e standards) are used in most LAN segments, with an exception in the HS which has fiber in locations.

<u>Network Hardware</u>

Switches and routers are the devices used to connect PC's 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 HP, Cisco, 3COM and Linksys, with varying age, condition, technical capabilities and port speeds. While routers are current models, some of the switches are older models. Some of these devices do have native management or advanced features such as VLAN or Layer 3 routing capabilities.

A number of managed, 12, 24 and 48-port switches service all remote site locations. These switches provide dedicated wire speeds of either 10/100Mbps or Gigabit. 75% of these switches have a current warrantee associated with them and the remaining switches would need to be replaced upon failure. Some redundancy features exist and additional options are being looked at. This hardware is classified for small business environments, and they provide acceptable performance given the Town's limited connectivity. In some cases, their switch ports have been fully populated, and would require upgrades should additional devices (PCs or printers) be installed. Many devices have been purchased recently while other switches have been in use for at least 3-4 years. Town hall switches are 10/100/1000 with options to upgrade to layer 3. Future plans will include Gigabit switches to all edge sites.

The WAN hardware currently being installed are Cisco 3700 and 2900 series switches. All switches come with a two year warrantee and makeup the hardware installed for the WAN.

Service and Support

The Town's ITD department performs all installation, configuration and support of LAN components. At present, there are minimal "break/fix" agreements with service vendors for any LAN equipment. With recent support staff levels and the onset of more sophisticated WAN equipment which will supply routing and connection orientated management, additional warrantees and redundant hardware will be needed.

Any equipment not covered by warranty is replaced on an as needed basis. At present, annual estimates for "repairs and maintenance" needs, including all IT inventory, are submitted in the IT departments operating budget restraints. The Town purchases replacement equipment from local vendors, most are on the State contract.

III. Servers

The Town's IT department manages a total of 11 servers in 5 buildings. These systems provide most of the production applications for Town agencies. Server roles and other descriptive information are provided below.

Exch-Server

Server Role: Domain Controller and Exchange server

Basic Configuration: PIV-Xeon 2.4 GHz, 1.0GB RAM, 72 GB RAID 5 storage

Operating System: Windows 2000 Server

Major Applications: E-mail

This server was purchased in 2002 and supports current applications well; extended warranty.

App-Server

Server Role: Print, SMTP-Relay/Anti-virus, RAS.

Basic Configuration: PIV-Xeon 2.4 GHz, 1.0GB RAM, 72 GB RAID 5 storage

Operating System: Windows 2000 Server

Major Applications: Symantec Antivirus E

This server was purchased in 2002 and supports current applications well; extended warranty.

SCO-DNS

Server Role: Application server, File and Print

Basic Configuration: PIV-Xeon 2.4 GHz, 1.0GB RAM, 72 GB RAID 5 storage Tanberg 2.5GB tape SLR-5.

Operating System: Unix-SCO Version 5.0.5

Major Applications: Data National File & Print

As the Financial Management server, the Town's network users connect to this server for access to all data National modules. This server's primary role is to provide Payroll and Financial Management applications for Municipal and School users.

This server was purchased in 2003 and supports the current application. Unix-SCO OS is stable but outdated and it's becoming continually more difficult to find qualified vendor support. Maintenance is performed by the ITD. With the older OS and ongoing issues with the DN application, the ITD is currently evaluating new replacement applications.

Assess Server

Server Role: Member server

Basic Configuration: PIV-Dual Xeon 2.8Ghz; 2GB

Operating System: Windows 2003 Server

Major Applications: Patriot Assessment

This Dell 2850 is dedicated to Assessors SQL Db program (Patriot) and Internal web-hosting.

This server is still under warranty and is configured appropriately to support the above services through FY09.

GIS WSUS

Server Role: GIS hosting, Patch Management server

Basic Configuration: P-IV, Dual Xeon 2.8 4.0 Gab RAM

Operating System: Windows 2003 Terminal Server

Major Applications: Arc Map 9.1, WSUS

This server supports Microsoft Patch Management software and Terminal Server clients utilizing GIS.

Storage Server

Server Role: File & Print services

Basic Configuration: P-IV, 2.8 1GB RAM

Operating System: Windows 2003 Storage Server

Major Applications: N/A

This server is new in FY06 and handles Network F&P services.

This server is under warranty and is configured appropriately to support the above services through FY09.

COA Server

Server Role: PDC, File & Print, WINS

Basic Configuration: PIV-2.8Mhz, 2.0GB RAM

Operating System: Windows 2003 Standard A/D

Major Applications: Serv-Tracker/Star.

As a PDC, this server provides authentication services for the COA domain. It also hosts the COA database (Serv-Tracker). It provides file and print services, WINS and DNS.

This system was purchased in FY05, which introduced a COA Domain model from a Peer to Peer environment. ITD maintains the COA domain.

This server is under warranty and is configured appropriately to support the above services through FY09.

Marhfld Fire

Server Role: PDC, File and Print, WINS, Exchange 2000, SQL.

Basic Configuration: PIII-233Mhz, 1.0GB RAM Compaq ML

Operating System: Windows 2000 SBS

Major Applications: Firehouse software

This server was installed to provide file and print services to the Fire Headquarters, as well as terminal services to remote firehouses. It is configured as a domain controller within its own domain, MFD-Server.

This SBS was purchase and installed by a MFD consultant in 2002 and is covered by warranty and maintenance contract until 3/2006. Town IT is responsible for overseeing the contractor support, system health and working in conjunction with MFD support consultant. This system is adequately handling its current duties, but does require regular scheduled visits to maintain partition space for proper performance.

MPD Server

Server Role: Domain Controller

Basic Configuration: PIII, 1.0GB RAM Compaq ML

Operating System: Windows 2003 SBS

Major Applications: Exchange 2000, SQL

This server was installed to provide Exchange email services. Term Services and Remote access.

This system is no longer covered by warranty or maintenance contract. Town ITS is responsible for maintenance and support of this system and to assist Detective Marcolini in these same duties. The system was upgraded to Windows SBS 2003 in Fall 2006.

This system provides adequate performance, given its existing workload.

Library

Server Role: N/A

Basic Configuration: Point to Point

Operating System: Windows 98 OS

IV.   Network Platforms, Systems & Services

Network Operating Systems

The Town currently operates with three different Network Operating Systems (NOS). Windows 2000 Server, Windows 2003 SBS, and SCO Unix.

The Town's network security is controlled by Microsoft Window domains operating in what is known as "Mixed-Mode" and "Native-Mode". The use of Windows servers reduces the availability of data to unauthorized personnel. There is one master forest domain in the Town Hall and other local domains in Fire, Police, and COA sites.

The need for the multiple domain model is driven not by security considerations, but primarily by the lack of infrastructure in place. The lack of a WAN backbone consistently requires more hardware, maintenance and service than a single domain model would. The costs associated with the multi-domain model justify the Wide Area Network (WAN) and its ability to increase availability from all locations.

The following factors drive the need to build plant for purposes of leveraging existing services, cutting cost, and reducing the overall overhead of maintaining multiple domains.

- Microsoft's support lifecycle for Windows platforms are typically five years. The need to maintain supported server environments is crucial to success.

- Multiple Microsoft's Small Business Server (SBS) will be up for replacement in 1-2 years. Migration away from SBS to Windows 2003 Enterprise Server will allow for integration with the Town's strategic plan for mobility, scalability with availability.

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 plant needed to satisfy these goals has been only partially built.

- The funding required to purchase the hardware, software and services for this project has not been appropriated in full.

SCO Unix 5.05 is the operating system for the Financial Management System. The vendor offers service and support for this system. The Town's IT department maintains hardware and interacts with Data National Corp for support.

E-Mail

The Town utilizes Microsoft Exchange Server 2000 for its email services. Exchange servers are located in the Town Hall, Fire headquarters and Police department. All servers operate as an independent email domain.

Exchange 2000 is identified as having security flaws when accessing email remotely utilizing the HTTP protocol. This has required other technologies be used to secure these packet transfers. While the product is supported currently, an upgrade to the latest version of Exchange will increase security and collaboration efforts while supplying needed remote email access.

Spam email has been a problem for Marshfield. Spam cuts down on productivity, absorbs resources and causes additional measures to combat it. The integrated approach to WAN regulated services allows Marshfield to secure and prevent intrusions through State-full packet inspection and additional Spam guards from one central location. This solution is a proposed addition to the build-out of the hybrid WAN. Current solutions incorporate Anti-Spam software loaded on the servers and/or workstations in all domains. This solution only filters mail for the Town Hall server. However, Fire, Police and COA have instituted similar solutions.

<u>Internet</u>

Internet access is achieved with a number of connectivity methods. Town Hall and the School System both reach the internet through multiple T1 lines. The allocated bandwidth varies by circuit. Most T1's the school system utilizes has 768 Kbs of bandwidth. The Town Hall utilizes a Fractional T1, which provides 384Kbs of bandwidth. Remote municipal locations are currently utilizing dial-up and broadband connections supplied by Adelphia. Bandwidth allocations fall short of the utilization needed to comply with the existing technology needs and they will not meet the future master plan requirements.

All inbound and outbound internet traffic is filtered by a Microsoft ISA Server, ISP Firewalls and external security devices (Fortinet). Remote access security is configured utilizing VPN's and firewall authentication. The upcoming WAN project will propose a Cisco Pix 515E/DMZ and a VPN Concentrator for authentication access.

At present, the Internet is heavily used for some department processes and services and includes the use as a connectivity medium for VPN Tunnels, and some remote Db access. Most users consider it to be a vital network resource. Email is now integral to most users' daily communications, and many use web browsing extensively for research. With the lack

of a WAN, the Internet is a main stream connection method when utilizing email, and critical when supplying some remote off-site services from vendors.

Data Storage

Data classified as:

- Application data – databases produced by applications, such as DNC, Patriot.
- 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 Storage Server hard drives. All Domain Model users have a mapped drive pointing to a directory on the server, and a majority of the users' documents are stored there. There are multiple locations for users to store data; i.e., department directories, user directories, and shared directories. All users are encouraged to save data to storage vs. local hard drives. This ensures data integrity and availability in the event of PC failure. Raid, Tape Backups and Intelligent Disaster Recovery technologies are used to promote recovery in the event of hardware failure. Offsite backups are encouraged for all domains.

Backup

Automated tape backups are scheduled daily and Redundancy drives are configured accordingly.

There is no centralized mechanism for this service. Many servers are backed up independently with local tape backup units of varying capacity. This method is less than ideal. Managing different drive and media platforms is at best inefficient, particularly with significant growth in storage requirements. Though time consuming in its approach, the current Tape Auto-Loader has increased the speed and available backup data to a new high. Again, leveraging interconnectivity between buildings allows for a robust data backup methodology for all remote locations. This technology will be re-examined when the WAN is functional.

Backup Power

Backup power services in the Town Hall have recently been upgraded with the anticipation that the new fiber switches and additional Storage units will be adequately powered. The recent server room renovations (AC, storage) have stabilized the environment for all servers and hardware for the foreseeable future. Power units are manufactured by APC and are both rack mounted and floor models. UPS floor models are in remote locals.

Printing

Depending on the application, printed output is produced on high-speed laser/multifunction devices that reside on the network, or on local desktop printers. Most production applications are served by the speed and efficiencies of networked work horses. Also utilized are local printers with varying degrees of options. Town Hall utilizes eleven networked printers/plotters and as many local printers and multi-function devices.

Based on the current models of printers, and the page counts delivered for the past two years, the HP Networked printers meet the current demand. These ten printers also fall under a service contract with SMH Electronics. The IT budget forecast has an allocation for the upgrade of one printer per year assuming all budgeting factors remain constant. The initial printers which are targeted for replacement are the slower workgroup models. Many local printers can be rebuilt time and again, and are less expensive to run than newer models.

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:

- Proposed Network traffic is to be routed at all sites. This significantly improves overall security and performance.

- Proposed Security measures at the WAN level will be governed primarily by the Cisco and Sonic wall CF devices. Routing from all sites to their destination will pass State-full packet inspection and anti-virus/anti-spam packet inspection. LAN security is currently achieved through a number of authentication methods.

- Most applications require their own username and password credentials for access. Direct access to data files is secured by permissions granted at the network operating system level.

- Town Hall workstations have all been upgraded to Windows 2000 and Windows XP Pro operating systems. The remaining sites with domain models have Windows 98 and Windows XP PC's. Servers are running in Mixed Mode and patch management initiatives are not in place with the exception of Town Hall. Additional goals to implement Patch Management throughout all remote domains have been stalled due to lack of resources. This problem will be resolved once the WAN is functional by allowing remote sites to perform patch Management updates from a dedicated server.

- Users are free to browse web sites at their own discretion after the acknowledgement of the Town's computer usage policy.

- Protection from "Spy ware" is not present on all desktop systems. Spy ware 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 creating a system vulnerable to outside attack. The IT department has begun looking into an integrated solution which can be loaded remotely by script or policy. Other options allow for packet inspection at the Gateway which protects the LAN prior to packet access.

- The Town had deployed Microsoft ISA Server 2000 to provide perimeter protection for its Internet gateway in some locations. ISA Server is a multi-layered 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. Current initiatives to ramp up the security platform are directly linked to the installation of a WAN infrastructure.

VII.   IT Staffing

The Town's Information Technology Department is staffed by a full-time IT Coordinator, Ron Menard. Mr. Menard has taken the Marshfield Municipal sector from an environment which utilized outside vendor support 100% of the time, to the first full-time in-house position.

The IT Director's goals and daily tasks charge him with the responsibility for maintaining the Municipal sectors infrastructure, as well as the budgeting, planning and all administrative duties of the department. The IT department supports approximately 200 users in over 25 departments and committees. In the two year period that the IT department has been in operation, numerous new technologies have been added. As is the case with any organization with reliance on Information Technology, the demands on the IT Department have grown exponentially. Applications and technologies such as email, Internet, GIS, Wide Area Networks and Local Area Networks have been assessed and evaluated to supply direction and vision for purposes for providing a solid infrastructure backbone in line with this Master Technology Plan. The plan offers direction and fundamental planning for Marshfield's Technology future. Based on similar sized towns with similar infrastructure, the level of staff for all in-house systems falls short of the requirements. An additional support staff technician should be implemented, as should a part time GIS coordinator if we are to maintain the existing and new requirements upcoming.

VIII.   Municipal Software Applications

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, and inspections. 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 Assessor's Office may record changes 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 currently is seeking a custom database to maintain mooring records, daily logs, etc. The GIS is being looked at with the goal to map and track these resources. Additional efforts will be needed to identify an application for the permitting process. This one common municipal issue resides in many departments, and possible software integration may be a solution.

Many Land Record 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.

State-of-the-art Land Records applications can provide for on-line applications, payments, tracking, and related Land Records activities. These applications should be examined to determine where the application can resolve the disjointed approach in the permitting and licensing processes, as well as offer potential for online submittal and access. The ITD has identified numerous applications which offer options which fulfill the requirements above. These application cost vary but range from $45,000 to $65,000.

Imaging Systems

The ability to image documents for purposes of electronic archiving and indexing is crucial to Marshfield's historic preservation as well as the town's ability to conform to State guidelines for document archiving. Image and Archiving Cost: $75K

Financial Management System

The Town's Financial Management System was purchased from Data National Corp. in the 1990's. 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

DNC also provides Marshfield with a payroll module, and it is currently used by the School Department as well.

The existing system has been in use in Marshfield for approximately 16 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. The ITD and other department heads are currently evaluating other software options.

The Accounting modules are used by both Town and School in a fully-integrated fashion. The School Administration Building has remote access through a 768Kbs T-1 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 a problematic performance 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.

Police Crime Database Application

The Police Department has endured an antiquated application for over 12 years. The database runs on a UNIX based platform with poor GIS data base integration options, slack software support and an antiquated programming language. The application which houses their Local Crime Statistics has no interface to link additional external databases or expand its role as an additional data base server due to age and operating system.

With the need to interact with Homeland Security forces, FBI and other law enforcement entities, the Marshfield Police Department has been looking for alternatives for two years. The most robust application currently used in law enforcement which operates on a global integrated fashion is IMC software. This application is used in a number of communities and allows for integration and sharing of Local and Regional Databases. It has a built in GIS interface and can be used remotely by mobile user in an easy integration fashion.

The cost for the IMC application is $95,000 dollars. The cost for server hardware and integration is $30,000 dollars. ITD recommends that this server which is housing dangerous criminal information be replaced with the new state of the art server and software. Mobility for data access has become a key component within the law enforcement community. The migration to this new system will move Marshfield Police department into and integrated mobile communication and data access system.

This upgrade should be considered a high priority status if Marshfield is to link with Regional Disaster planning and Homeland Security initiatives set forth on a state level.

Based on the information uncovered from this study, ITD is recommending 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 are based on the existing technologies and applications currently available in the market and those technologies which have a following with regards to vendor hardware and software. A detailed deployment project plan is needed.

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. Detail costs for project planning and product specification are not included, but do suggest a range of cost.

1)   WAN upgrade

        The Town should set goals over the next two years for a WAN build out. There are several possible solutions, each offering varying degrees of cost, performance, scalability. They include a WAN for the Intra-communications of all remote and primary sites consisting of fixed broadband wireless (WiMax) and private fiber optic cable.

        Based on the Town's geographic size, economic constraints, long- and short-term needs, ITD believes as other Towns have, that the best solution would be a combination of fiber optic and wireless segments.

        Though this approach leaves many technologies available for selection, it drives the Town to evaluate options with regards to Line of Sight and Point to Point solutions when looking at remote site connectivity. Marshfield has numerous Towers available for these purposes. In fact, Marshfield already leverages water towers and Communication Repeater Towers for purposes of monitoring the water department's infrastructure using the SCADA application. The initial phase of wireless hybrid

incorporation deems it necessary to perform a Feasibility study to evaluate the needed bandwidth as well as to match the proper wireless solution for all locations.

Fiber optic cable is an established technology and offers the highest levels of performance, security, reliability and ability to support current and future technologies. Marshfield has begun the build out of this preferred backbone and is due to complete it in 2007/2008 timeframe.

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., Remote Fire Stations (2), Water Treatment Facility, Harbormaster Office, Recreation Department, Animal Control, Transfer Station and Eames Way School could all leverage wireless links. If, however, it becomes possible to create fiber segments to these sites without substantially exceeding the total WAN cost estimate, ITD would recommend that the Town consider doing so. In any case, all other locations would be connected to the WAN by fiber.

The WAN's Head end will be located at the Town Hall in the current server room. All fiber links will originate from the core with a redundant backhaul if feasible.

All fiber and wireless installations must conform to national, state and local codes. Exact specifications regarding frequency and site mapping 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.

Given the current cost of PTP solutions and the 768Kbs T1 circuits, the $100,000 being spent in recurring annual cost, justifies the goal to integrate services and connectivity between schools and municipal sectors. With initial savings of $70K per year the INET project could be paid for in the first 4-5 years.

Description	Estimated Cost	Notes
Fiber Segments	$ 420,000	
Wireless Segments	$ 214,000	Feasibility study needed
Total	$634,000	

Due to the fact that these estimates have not been based upon a complete detailed study, the wireless figures above are ballpark figures based on in-depth knowledge of Marshfield's infrastructure and some inquiries for Wireless bandwidth cost.

Assumptions have been made that Marshfield will leverage the utility space provided to the Town on each utility pole with no cost estimates for attachment as well as the use of existing under- ground conduits. Further assumptions are being made as to no cost frequency being used and predominantly favorable LOS or PTP options.

Additionally, ITD suggest the migration to an IP Telephony system, replacing the existing Centrex system which generates cost in the $70,000/year range. The school currently has a robust IP Telephony system which could be enhanced and used to drive the entire Municipal telecom system. Marshfield should consider replacing its existing legacy voice systems with an integrated IP telephony solution.

With a private fiber network solution, the Town would be well positioned to adopt IP Telephony and leverage the benefits such as Disaster Recovery and Centralized Management options.

2)   Internet Connectivity

The recommendation to integrate Internet access is still being evaluated. The Schools' ability to consolidate T-1 lines with the Towns could take advantage of the deployment of its new fiber network. This is obviously cost dependant and a closer study of the Schools' band width requirements is needed prior to establishing this contract.

3)   Server Replacement

With some servers approaching their end of useful life and out of warranty, we recommend that the Police and Fire Departments adopt a Server Replacement Plan. This cost would be in the neighborhood of $15-$20k per server.

Changes in applications and technologies, as well as opportunities for consolidation make server replacement planning difficult. 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.

Description	Estimated Cost	Notes
Servers	$20,000	
Services	$20,000	
Total	**$40,000**	

4)   NOS Migration

Support for Windows 2000 Server has already been assigned the End of Life (EOL) date. Microsoft 2000 support will end June 2006.

Upon completion of the WAN upgrade, the Town should upgrade its core network operating services, including Active Directory to a Parent Domain. Though Police and Fire should maintain the existence of onsite servers, allowing those servers to participate in the Marshfield master domain model would allow Police and Fire the abilities to leverage services currently offered in Town Hall, i.e., Patch Management, remote backups, etc. The timetable should be targeted for FY 2008.

These upgrades are essential to the long-term stability of the Town's critical system and functions. For completion of this project we will require outside vendors for the implementation phase and utilizing the Marshfield ITD to handle Project management duties.

5)   Deploy a New Backup System

ITD recommends that the Town purchase a new back up solution which will perform a centralized backup of all domain services. 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 stand-alone backup systems are roughly $.19 per megabyte, while autoloaders typically cost $.01 per megabyte. The cost for including stand-alone drives and media for all servers would likely exceed $16,000 over the next 3 years, not including the cost of staff time to operate them. ITD would be the department to implement this technology saving the town $3500.00.

Description	Estimated Cost	Notes
HD Loader & Software	$13,800	
Services	$ 0	
Total	**$13,800**	

6)   Expand/Consolidate E-Mail Services

The management of multiple mail servers will no longer be necessary after the WAN upgrade and domain consolidation is completed. Given e-mail is a mission critical application that the Police and Fire Departments utilize and require on-site, the Town should upgrade to Microsoft Exchange Server 2003, and maintain mail servers located at the Police and Fire Headquarters. Currently COA, Library, Water Treatment Facility and Harbormaster utilize ISP e-mail services.

7)   ITD Staff Requirements

There will be the need to maintain the response time of the Town's IT support staff with the introduction of an additional staff position. The amount of new technology introduced over the last two years and the additional administrative duties relating to these projects has affected the ability of the support staff to maintain all facets of the department's duties. The need for an additional network technician to assist in network and PC performance issues is paramount if we are to continue with the high percentage of uptime on all systems. The IT Department's limited ability to use outside vendors for these duties due to reduction or re-allocation of resources is evident in the support staff's schedule. The inability of the Town to operate its current systems without a dedicated individual to back up the primary IT Coordinator could be disastrous. Outside vendors typically do not have the specialized expertise that many of the Municipal applications require, i.e., GIS, Audio-Visual systems and Telephony systems.

The Town has been operating with a single person IT Department for approximately 3 years. Although some of the current demands on the time of the Staff will be eased with the implementation of some of the ITD 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 the funding of out-sourced services. ITD would also like to reiterate that this report did not include a review of Town GIS requirements, a major contributor of additional workload. Therefore, comments made regarding the need for additional IT staffing resources are exclusive of GIS staffing needs.

In order to address it's increased IT staffing needs; ITD would recommend that the Town add $50,000 per year to its ITD salary budget, and consider adding a part time position for a GIS Coordinator.

8) 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 connections to the Internet subjects the Town's network to other risks and vulnerabilities, however, and while ISA Server component is relatively effective at combating these threats, I recommend that the Town purchase and deploy and enterprise level solution to replace the ISA Server component in remote sites.

Two highly effective solutions are Intrusion Prevention Systems and Content Filtering devices. There are outsourcing options available for this, but with recurring costs for the latter and a relatively low total cost of ownership, it makes an internal solution very attractive. In addition to spy ware and aware detection, this system will protect the Town's network from policy violations, vulnerability exploitations, and other questionable activities.

Based on our monitoring of packet traffic over the interface a number of different deployment options are available. Sonic wall, Cisco, Tipping Point and Check Point all make applicable devices. Cost for these is in the neighborhood of $3,500 to $16,000.

The estimated costs for deploying security are:

Description	Estimated Cost	Notes
Hardware/Software	$26,000	
Services	$ 2,500	
Total	**$28,500**	

9)   Establish a PC Replacement Plan

Current methods of replacement suggest that looking for funding when PC's are failing is not proactive; and a five year replacement plan is in order. Specifications should be instituted for the minimum hardware requirements going forward. Currently P4/512RAM and gigabit network cards would meet existing upcoming requirements.

It is ITD's recommendation that the Town replace PC'S on a 5-year cycle. The Town should choose a single vendor from the MA State Contract ITC05. Dell, HP, etc. all supply this hardware.

The turnover of current PC's in Town Hall would require the town to purchase thirteen units per year. The cost currently associated with this purchase based on today's numbers would produce the following yearly amounts. ITD would implement.

Description	Estimated Cost	Notes
PC Hardware	$15,600	
Services	$ 0	
Total	**$15,600**	

10)   Upgrade Network Printers

We recommend that the Town adopt the policy to replace 1 Network printer per year over the group life expectancy of the current printers in use. Yearly Cost:

Description	Estimated Cost	Notes

Printers	$9,000
Services	$ 0
Total	**$9,000**

11)   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.

ITD recommends that the Town standardize on Microsoft Office 2003 for its office productivity software.

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

The ability of the Town to push out deployment of these systems with current staff levels is not conceivable. Ghosting or mirroring software should be purchased and possibly have outsourced technical help for deployment operations.

Description	Estimated Cost	Notes
MS Office 2003 Licenses	$30,000	
Services	$ 0	
Total	**$30,000**	

12)   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.

Description	Estimated Cost	Notes
Software	$6,500	
Services	$ 0	
Total	**$6,500**	

13) 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.

14) Implement a Permitting Records System

The Town would greatly benefit from an integrated Permitting Records System that will integrate all of the Departments processes involved in the Permitting process. By adding a permitting application which is truly integrated, Marshfield will supply Municipal employees and the Marshfield constituents with an easy web-based application for applying and tracking the progress of permits. The capabilities of this system should include:

- Web-based interface accessible from all Internet based PC's.

- 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 Permitting business with the Town on-line, including applications, tracking, and payment.

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

- GIS integration as well as the ability to produce applicable maps & reports.

- 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.

Our estimated cost for a Permitting System is $65,000. This includes software, implementation and training services. Annual costs for software support and maintenance are estimated to be $8,000.

Should a new Permitting System be implemented, some consideration should be given to an approach referred to as ASP (Application Software Provider) or a Web Hosting Approach. 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 paying up-front costs for software and services, the Town will pay an annual fee for the system. It is estimated to be $8,000 per year.

15)   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 department database systems, 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.

An estimated cost for an updated Payroll/Financial Management System is $120,000. This includes all software, implementation, and training services. 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. Annual costs for software support and maintenance are estimated to be $45,000.

WIDE AREA NETWORK MAP

Server Replacement Matrix

Server Name	Now	Applications	Configuration	Replace	Cost
App_Server	W2K	DC-AV/AS/F&PSMTP_GW	Dell Power Edge 4600 P4/1.0Gb 36Gb HD Raid 5	2007	$20,000
Exch_Server	Win2K	DC-Exchange 2K, AV/AS	Dell Power Edge 4600 P4/1.0Gb 36Gb HD Raid 5	2007	$18,000
Financial Mgmt.	UNIX	SCO 5.0	Dell Power Edge 2600 P4/1.0Gb RAID 5 36 Gb HD	2007	$15,000
GIS_Server	W2k3	Arc-Map-GIS, WSUS	Dell Power Edge 2650, P4 4.0 GB RAM, 146GB HD R5	2010	$15,000
ASSESS_Server	W2k3	Patriot-SQL, IIS	Dell Power Edge 2850 P4 3.0Gb, 73Gb HD R 0,5	2011	$15,000
Storage_Server	W2k3	Windows Storage server	Dell Power Vault 745N 1.0Gb 146Gb R5	2010	$10,000
MarshFire	Win2k	DC, Firehouse, SQL, Exchange IIS, ISA, SBS Edition	Compaq Proliant P4 1.0Gb R5	2007	$20,000
MarshPolice	W2k3 UNIX	DC, SQL, Exchange, IIS, ISA Segus	Compaq Proliant P4 1.0Gb R5	2008	$20,000
COA_Server	W2K3	DC, SQL-MSDE, Serv-Tracker	Dell 850 P4 2.0Gb 36GbHD R0	2010	$15,000

Project Cost Summary

WAN Upgrade	$421,000.00
Core and Remote Network Upgrades	$80,000.00
Upgrade Internet Connection	$10,000.00
Server Replacement	$148,000.00
NOS Migration	$18,000.00
New Tape Backup System	$11,000.00
Consolidate E-Mail Systems	$6000.00
Upgrade Power Protection	$4500.00
Deploy New Network Security Systems	$28,000.00
Establish a PC Replacement Plan	$15,600.00/Yr
Upgrade Network Printers	$20,000.00
Standardize Office Productivity Software	$30,000.00
Purchase IT Asset and Help Desk Tools	$6500.00
Implement a Land Records/Permitting System	$65,000.00
Implement a New Financial Management System	$120,000.00
Total	**$600,500.00**

Add: Project Planning/Consulting Services

Grand Total

Estimated Annual Costs

Internet Access (gigabit Ethernet)	$18,000
Virus and Spam Prevention Updates	$ 5,800
IT Training	$10,000
IT Staffing	$140,000
Land Records Software Support	$15,000
Financial Management Software Support	$45,000
Electronics Records Management/Archiving	$85,000
WAN Maintenance	$25,000
Proposed Fiscal IT Budget TOTAL	**$313,800**