

**RURAL WISCONSIN HEALTH COOPERATIVE
VIRTUAL PRIVATE NETWORK
(RWHC VPN)

FEASIBILITY AND DESIGN STUDY**

September 2001

Innovative Healthcare Information Technology Solutions for Rural Americans

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1 Program Overview

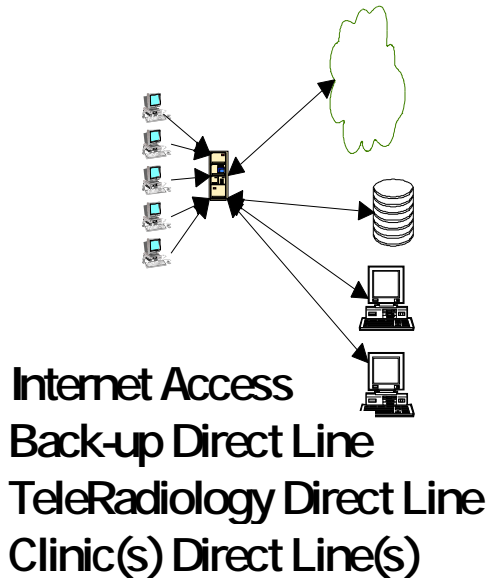
RWHC VPN Project Goal

Increase the number of cost effective Information Technology (IT) healthcare solutions available to RWHC members.
Position RWHC Members to take advantage of innovative IT Healthcare

- RWHC Project Objectives**
- Define RWHC Member IT requirements and capabilities
 - Identify RWHC VPN options
 - Identify and determine the value of RWHC Hosted VPN applications
 - Communicate and refine RWHC VPN options
 - *Implement representative number of cost effective IT healthcare solutions on a RWHC VPN proof of concept demonstration project*
 - *Collect data and evaluate the value of a RWHC VPN*

1.1 RWHC Member IT Requirements Summary

An RWHC member Information Technology (IT) survey was conducted. A variety of IT capability levels were observed. There was no specific correlation of IT sophistication to facility size or revenues. **The survey defined what could and could not be implemented among the RWHC members.**



The most significant repeated requirement theme relative to networking was the duplication and under utilization levels of telecommunication lines.

1. The figure to the left illustrates the normal network configurations, organized around dedicated telecommunication lines to specific organizations, such as TeleRadiology services and system backup/archiving services. . This type of application requires a wide bandwidth to transmit large volumes of imagery data. Current RWHC members have expensive dedicated T1 lines at an average cost of over \$1,000 a month. Additionally, these dedicated line are under utilized at 25% or less.
2. Individual RWHC members have dedicated Wide Area Networks to tie affiliated organizations into the facilities LAN. Frame Relay communication lines at 56K, are most often used.
3. Some RWHC members in more rural areas do not have access to cost effective telecommunication. These facilities are limited to simple POTS dial-up line connection, 28 to 56K connection rates. This type of limited connectivity capability does not allow for implementation of a wide variety of IT healthcare solutions.

4. A significant lack of data and system integration of in house healthcare IT solutions are currently pervasive in all RWHC member Information Systems.
5. Public access to healthcare information and services does not exist. All sites have Web Pages but provide only general overview information of the member's organization.

Following analysis of the site survey collected data the project requirements definition has been divided into three (3) functional areas; **Connectivity, Applications** and **Services**. These categories allow for logical grouping of both requirements and solution development.

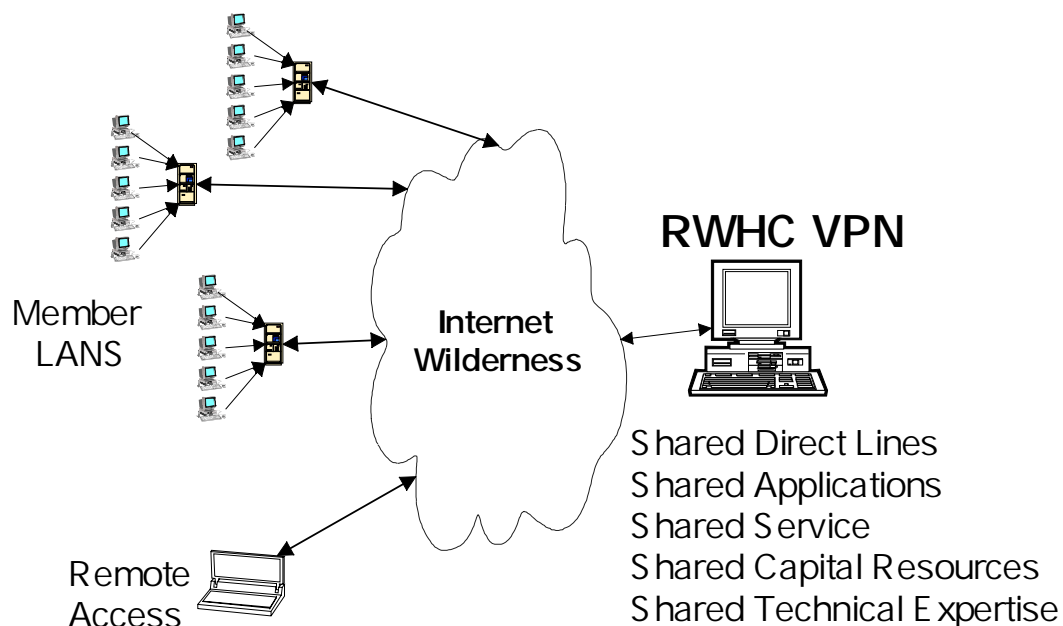
1.2 RWHC VPN Solution

WAN and VPN architectures were considered. Cost benefits analysis was conducted to determine which would be the most cost effective network design, with the best probability of long-term sustainability.

VPN architecture is the suggested network model.

The member connections will be accomplished with secure Internet connections through the RWHC VPN.

This unified connection will allow for RWHC Members to share resources thus creating the basis of cost savings of the VPN architecture. All members will be able to maximize communication line bandwidth. The RWHC VPN server will be a portal to affiliated organization, thus eliminating the need for duplicated and under utilized dedicated lines at each of the RWHC member sites. The RWHC portal is a central point to specialized medical databases and a home for jointly licensed and developed healthcare IT solutions. The following figure shows the basic RWHC VPN architecture. Connectivity from the RWHC member to the RWHC VPN applications and services are provided through the single scaleable Internet access.



1.3 VPN Benefits

Immediate cost benefits are shown relative to VPN connectivity options.

The cost benefits of additional IT applications and services available to RWHC members, at no additional costs, are intuitively obvious.

The intangible value of shared technical creativity for IT solution design and development is extremely significant.

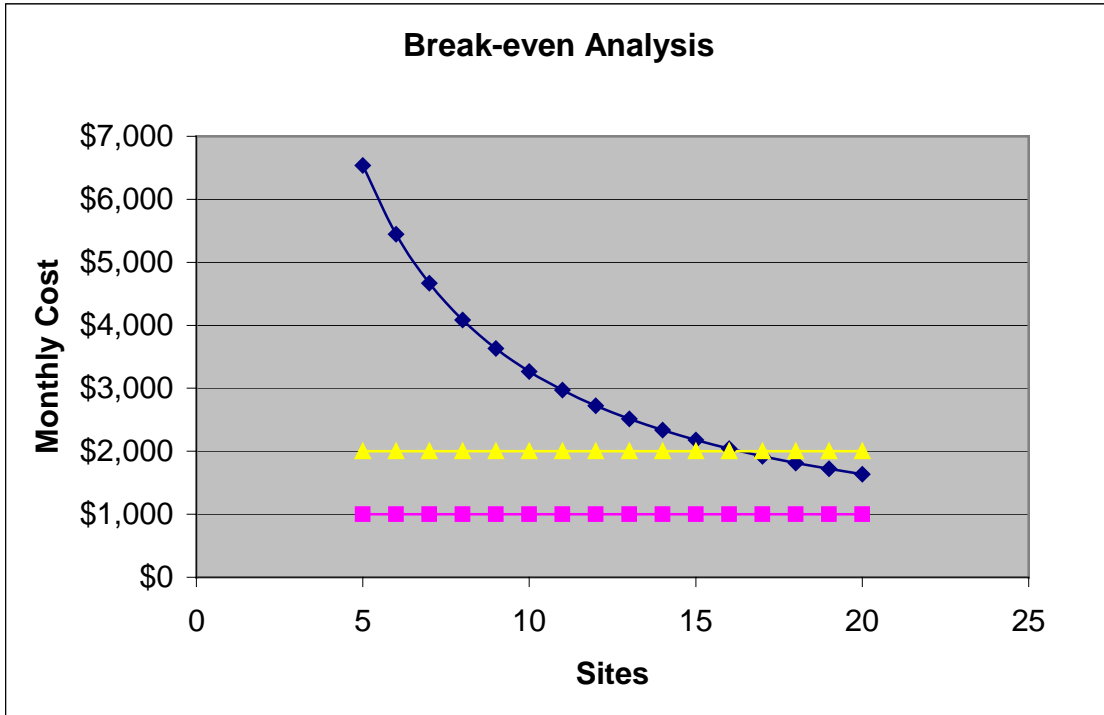
General advantages and benefits of a RWHC VPN are summarized in the following observations.

1. **Cost effective connectivity method**: Wide bandwidth connections will be available to all member organization through one Internet connection. This eliminates the need for multiple direct communication lines. Additionally, monthly communication costs can be significantly reduced with increased bandwidth and more efficient bandwidth utilization.
2. **Security**: Provides Internet Security capability to exceed HIPAA standards.
 - a. **Authentication**: The process by which a party proves its identity to another. Authentication allows us to verify a user identity, as well as, verify that data is coming from a trusted source. This includes authenticating an individual user, as well as, including authentication of the host where the information originated.
 - b. **Integrity**: Integrity ensures that the data has not been modified during transmission.
 - c. **Privacy**: Protecting private information from eavesdropping. Encryption provides privacy by modifying data so another, excepting the intended recipient, cannot view it. The sender and the recipient each have keys that are used to encrypt and decrypt the information that is being shared.
 - d. **Auditing**: The single best methodology for identifying network system failures, mis-configurations or internal/external attacks
3. **Shared Capital Cost**: The RWHC VPN implementation allows for development of one system that can be shared by all members. The alternative is each individual member would make the same capital investment and acquisition of duplicate resource to implement the same level of networking capability.
4. **Scalability**: Allows for and provide growth to the number of sites and remote users.
5. **Shared Applications/Services**: IT solutions can be jointly purchased and developed by RWHC members.
6. **Shared Technical Support**: A shared technical RWHC staff would maintain shared systems, application and similar Web Page projects.
7. **Remote Access VPN**: VPN provides a more reliable and faster connection then dial-up.
8. **Site-to-Site VPN**: Allows fro connection of corporate to branch office and connection business partners.

1.4 VPN Connectivity Cost Benefits

The cost savings of the successful implementation of a RWHC VPN will be significant and immediate. If a grant can be found to implement a demonstration project, equipment capitalization will help make the cost saving immediate and clear.

The following cost benefits analysis (CBA) graph highlights the break-even-point for the VPN implementation based only on savings in connectivity cost. If twenty (20) members equally participated in the RWHC VPN the monthly access cost would be \$1,200 a month. The savings to facilities with two (2) additional direct communication lines, at a cost \$2,000, will realize an immediate cost saving.



1.5 Funding Strategy

Funding strategies are based on the basic premise that the VPN architecture is a sustainable cost effective implementation.

RWHC Network Member Contributions

Member financial contribution is possible and justifiable, based on connectivity cost savings.

Financial Support from Affiliated Organizations

Currently affiliated organizations (i.e. Gunderson) are paying **10s of thousands of dollars each month** to maintain T1 lines throughout RWHC member organizations. The VPN solution will save them many thousands of dollars each month. This should be an easy sell to these larger healthcare providers.

Unique Grant Support Strategies

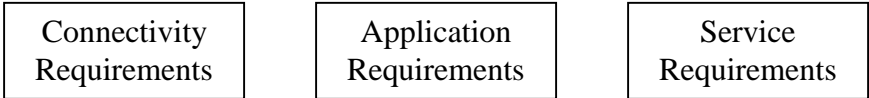
Grant sources are available for distinct healthcare needs. The RWHC VPN project provides unique solutions for a number of the targeted healthcare need areas. Initial capitalization can be searched for based on these healthcare needs.

2 Requirements Analysis

Site survey analysis determined what could and what could not be implemented as RWHC network solution option. Requirements and resources were identified.

RWHC Member Survey:

Data collected during the site surveys can be found in Section 11, Supplement 1, of this report. RWHC member IT staff were interviewed to determine facility external connectivity, general IT philosophy and general IT application utilization. Local IT surveys also included talking with local school districts, telephone companies, ISPs, cable companies and economic development companies to determine if there are any unique IT networking activities within the member communities, which might provide a unique opportunity for the RWHC networking solution. Requirements definition has been segmented into three (3) functional categories. This structure allows for logical organization of functional needs and solution development.



Health Collaborative Network Survey:

In addition to the RWHC site survey, interviews were performed with other healthcare organizations. The outside organization interviews consisted of site visits, document review and website review. The intent was to glean ideas and applications that might be transported to the RWHC VPN solutions. Several applications were identified as possible utilization over a VPN. No connectivity solutions were found.

As a rule, wide bandwidth WAN solutions are expensive and not cost effective.

If more network applications could be implemented over the WAN dedicate lines, increasing utilization rates, the cost per transaction could be reduced making the network solution more cost effective.

Upper Peninsula Healthcare Network
710 Chippewa Square
Marquette, MI

Iowa Health System Community Network
1200 Pleasant St.
Des Moines, IA

SISU Hospital Consortium
Duluth, MN

Community Health Information Collaborative
Duluth, MN

Contact should be maintained with all these organizations to learn from network development experiences over the next few years.

2.1 Connectivity Requirements Overview

Key Connectivity Design Parameters

Key network design parameters were identified and considered during the network solution analysis:

Wide bandwidth: is needed to be able to send and receive large amounts of data quickly.

Scaleable bandwidth: The network hardware and software must be adaptable to increase or decrease bandwidth, as user needs change.

Fully utilize bandwidth: Installed communication lines must be utilized to the maximum level. Excessive bandwidth with low utilization rates is not cost effective. All RWHC member current wide bandwidth network solutions are under utilized. This presents an obvious opportunity for a network solution.

Low connectivity cost: Communication lines tie a network together, the cheaper the cost of these connection, the more cost effective network solution. Communication line costs vary greatly throughout Wisconsin. The closer a facility is to an urban environment the less expensive the communication lines.

Low cost per transaction is the primary criteria to be concentrated on in the network solution design. Many recent TeleHealth projects have failed because of the high cost per transaction. This was due to high initial capital investment cost, high connectivity cost and low number of transactions. These critical cost factors create an unsupportable, high cost per transaction solution.

Key RWHC Connectivity Observations

Duplication of communication lines: Many of the RWHC members have dedicated T1 lines from their organizations to common healthcare affiliated organizations.

Additional RWHC members would find value in these services if they could afford the connections. These expensive dedicated T1 lines represent a duplication of resources and a vastly under utilized resource. None of these T1 line are being utilized at 25%. This represents a huge waste in resources and real opportunity for a new network design.

Affiliated Organizations	Nr. of Lines
Gunderson	4
Dean	4
St Mary's	3
Other	6

2.2 Applications Requirements Overview

The following table summarizes application requirements gathered from site survey interviews, healthcare professional interviews, periodical research (national surveys) and application implemented at other healthcare IT collaborative networks. A review of current applications at RWHC member facilities defined the current software application being employed. These top level requirements should be used to help define the value and need of targeted IT Healthcare solutions to be implemented over the RWHS VPN.

•Improved scheduling services
•Access to information and services from home
•Improved clinical communications
•Improved links to physicians
•Clinical information systems
•Monitor home healthcare data
•Improve links to pharmacies
•Allow consumers to be better informed of their healthcare
•Posting healthcare information for consumers
•Improve communications between physicians and patients
•Monitor patient satisfaction after visits
•Educate patient before, during and after treatments
•Insurance eligibility
•Processing claims
•Insurance reimbursement
•Improve productivity
•Reduce costs
•Financial applications
•Electronic interchange to suppliers
•Bridge to other information systems
•HIPAA Compliance Support
•Email
•Online research
•Continuing Education

2.3 Services Requirements Overview

Along with the application needs, service needs have been identified. RWHC members are currently using all the following services.

•System Back-up Service
•Mass Printing Services
•Education Services
•Web Page Services (Physician and Public)
•IT Technical Expertise

2.4 General Statement of Need Overview

Cost effective IT healthcare solutions are needed to help control costs and provides critical services to rural Wisconsin. These solutions can only be achieved by procuring low cost connectivity and development of valuable IT healthcare solutions.

2.4.1 Consumer Needs

Communication between Healthcare provider and rural citizens: Recent surveys show that 40% of rural Minnesota and Wisconsin citizens have direct access to the Internet. This portal can be used as line of secure communications between the healthcare provider and the patient. Access to information over the Internet will grow.

Digital Divide Initiative: Despite the growth of access to the Information Highway, many elderly, low income and disabled rural citizens do not have access to the Internet. This segment of the population could be serviced with healthcare information specific initiative managed by the RWHC. This type of program would provide service to your customer base and serve as an excellent public relationship program.

2.4.2 Healthcare Provider Needs

Expertise in Emerging Information Technologies: Each RWHC member is at a different level of need. Some members have fairly sophisticated IT capabilities while others are far less developed.

Access to Inexpensive Telecommunications: Some members are in more urban areas and have access to more developed telecommunication infrastructures. At the other end of the connectivity spectrum few members have access to POTS lines and 28K dial-up ISP connectivity options.

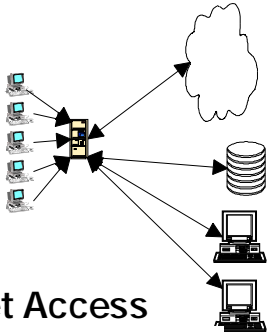
Healthcare Work Force Shortages: An innovative methodology for training potential workers in their homes. This will eliminate problems during the education process such as childcare. And will allow for potential workers to set their own training schedule around family needs and current employment schedules.

Lead Public with Information Technology Healthcare Solutions: There is a lot of bad and misleading healthcare information on the Internet. With more and more health care information being made available over the Internet a methodology to lead your customer base is needed. A local oriented website with controlled links may help lead the rural citizens to helpful and useful healthcare information.

3 Network Connectivity Options

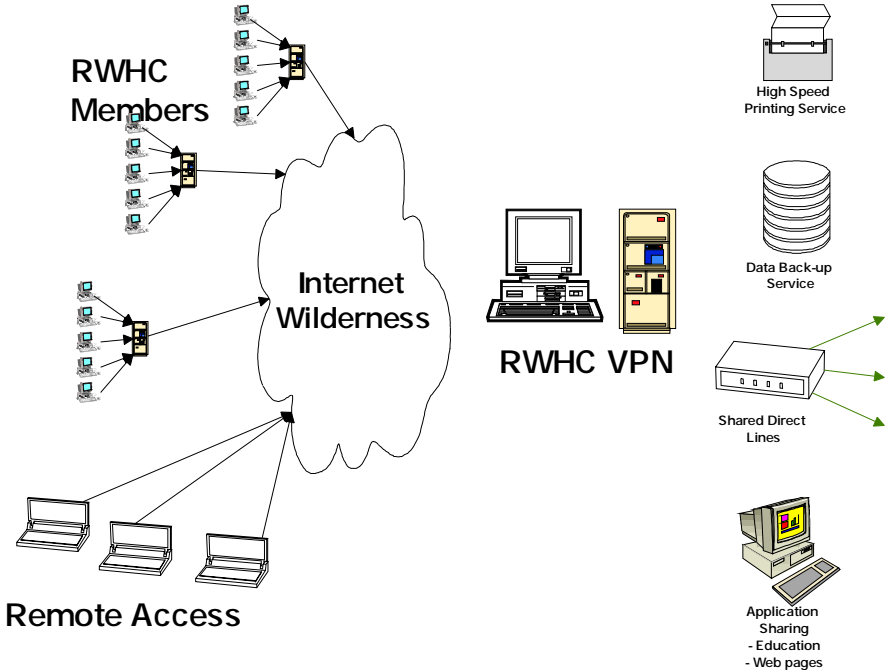
Four (4) networking options have been considered. Two Wide Area Network architectures and two Virtual Private Network architectures were defined and analyzed for cost effectiveness.

- 1. Independent Member WAN
Solutions: A network of direct lines from the organization to external organizations, as graphically illustrated in the figure to the right.
- 2. RWHC WAN: The network utilizes a series of dedicated lines to tie the separate organizations together and dedicated lines to outside organizations.



Internet Access
Back-up Direct Line
Application Direct Line
Clinic(s) Direct Line(s)

- 3. RWHC VPN: The VPN network utilizes an Internet connection from each member's organization. All communications travel through the Internet and the RWHC VPN server. Joint applications and shared access to direct lines to other organizations through the RWHC VPN. The following figure illustrates multiple members and remote users connecting to the RWHC VPN through the Internet. Access is then provided to multiple RWHC VPN applications and services.



4. Independent Member VPN: A Independent Member VPN can and is being implemented among the RWHC members. This solution does not include the shared applications, resources and lines of the RWHC VPN solution. But all the other connectivity benefits are available.

What is a RWHC VPN?

The Term “VPN” or “Virtual Private Network” is

1. A client computer connects to its local Internet Service Provider (ISP) providing connection to the Internet.
2. Special client software recognizes a specified destination and negotiates an encrypted VPN session.
3. The encrypted packets are wrapped in IP packets to tunnel their way through the Internet.
4. The VPN server negotiates the VPN session and decrypts the transmitted IP packets.
5. The unencrypted traffic flows normally to other LAN servers
6. A VPN solution, whether running on a firewall, NOS, proxy server, router or stand-alone VPN system, exists outside of the organization LAN.

3.1 RWHC VPN Functional Description

The following table outlines the functions and components of the RWHC VPN. At the time of implementation, the chosen vender will provide the final design.

VPN Overview Description

	Network Component	Description	VPN Cost Benefits
A	Member Firewall	Provides Security to Member LANS. Firewall modifications may be needed to assure VPN compatibility.	
B	Member Internet Line	Provides Internet Access, Email capability and VPN connectivity	One wide bandwidth Internet connection will handle the current need for multiple expenses and under utilized direct line connections.
C	Internet Cloud	The Cloud to any where and from any where	One access point. Can be accessed from anywhere. Eliminate direct line needs.
D	VPN Internet Line	RWHC VPN Connection to the Internet.	
E	VPN Firewall	Provides Added Security to VPN Applications	
F	VPN Server	Configures and manages the RWHC VPN	Shared technical services to manage one machine versus capital investment and technical requirements to manage multiple VPN machines at each member’s organization.
G	VPN Services	Shared services requiring hardware and software	Shared cost and resources
H	VPN Applications	Shared applications either jointly purchased or developed for the RWHC VPN	Shared cost, design, resources and collaboration
I	VPN Direct Lines	Shared direct lines to commonly access organizations to include TeleRadiology sites.	Many members have wide bandwidth lines to the same organization. Lines are expensive and under utilized. Some members currently not utilizing theses services could now afford these services through the VPN.
J	VPN Memberships to Medical DB	Shared membership access to include medical databases and internet publications	Shared cost

3.2 RWHC Hosted VPN

The RWHC Hosted VPN requires all VPN hardware to be purchased and maintained by RWHC. Along with the hardware and software it requires a 0.25 Sr. IT Engineer FTE and 0.50 of an IT Technician FTE. The hardware and software configuration should be oriented toward a specific vendor. Based on personnel comments and recommendations the Cisco solution appears to be a strong contender.

RWHC Hosted VPN Configuration Options

Server	Firewall	Firewall Secure Software	Switch	Modules	Router	Router Software	Total
NT Server	Cisco PIX Firewall 515 (plus maintenance agreement)	Cisco Secure ACS Software	24 Port Cisco Switch	WIC-1DSU-T1 Modules	Cisco 2611 Router	Router Software	Cisco Configuration

Other components of the RWHC VPN Demonstration Program are:

1. ISP Connectivity: This line provides the portal to the Internet. This access point is scaleable; it can be increased as usage on the RWHC VPN increases.
2. Direct Line Connectivity “A”: The dedicated direct line provides access to affiliated organization and services. All RWHC members through the RWHC VPN Internet portal will share these lines.
3. Direct Line Connectivity “B”: Same as Direct Line Connectivity “A”

3.3 RWHC Vendor Hosted VPN

Some of the advantages of a RWHC Vendor Hosted VPN provides a fully managed VPN solution, with no-up front capital expenditures, reduced risk, predictable monthly fees: \$20 per remote access user and \$300 per VPN server, \$1000 setup fee per remote access site, and \$1500 server site setup, 24 hour end user help desk, no in-house VPN expertise required and VPN client software.

The current concern with IT managers in the added level of partnership agreements which will be needed for HIPAA requirements. This is not a critical factor but will require some corporate education and acceptance. VPN vendors have extensive experience with healthcare providers throughout the country.

3.4 Independent Member VPN Design

Some RWHC members have already implement VPN solutions. These existing VPN solutions provide a method for remote access to the facilities LAN and access by remote clinics. The existing VPN solutions have been implemented with in-house and with local cable company’s solutions.

3.5 Internet Connectivity Options

One component of the VPN is the link between the RWHC LAN / RWHC remote user and the Internet cloud. Key factors to consider in choosing an Internet Service Provider (ISP) are:

1. **Price:** Bandwidth must be cost effective.
2. **Bandwidth:** The bandwidth must be sufficient to handle application needs. The bandwidth should be used at a normal operating capacity level of 60 to 80 percent. The Bandwidth connection must be easily scalable to accommodate business variations.
3. **Availability:** Bandwidth must be accessible from your location.
4. **Quality of Service (QOS):** Bandwidth connectivity must be available nearly 100% of the time. Some connectivity options are vulnerable to low quality of service.

The following table summarizes some of the methods to access the Internet and the RWHC VPN. These methods of access can be used from remote and member sites. Some satellite connectivity service options are vulnerable to rain storms, which will interrupt continuous service.

Internet Connection Type	Bandwidth	Cost
Dial-up ISP	28K	\$30
Satellite ISP	512K	\$60
Wireless ISP	56K-1.4M	\$60-\$350
Cable ISP	512K and up	\$50
Direct Line		
ISDN	128K	\$100
DSL	128K 1M	\$80-\$360
T1	1.4 M	\$1200
Connectivity Through RWHC	56K	\$50

3.6 Member Firewall Connectivity Issues

Each member's firewall hardware and software will need to be evaluated to determine if any compatibility issues exist.

4 VPN Application Options

Inexpensive connectivity has no value if you have no valuable applications to run on the communication network.

Two sets of applications toolboxes are provided, Phase “One” and “Two”. Further review and analysis will be cause for some adjustment to the two tool sets. An attempt was made to put the most likely to provide positive return in the minimum time into Phase One. The Application Working Group will determine which tool sets are to be implemented.

Phase “One” Application Pool

These applications are believed to have to most likelihood of success implementation and high value return.

Shared Application	Education	Shared Direct Line Applications
Licensed Applications	CME	TeleRadiology
Partnerships with vendors		
	Application Training	Back-up Services
RWHC Service	MS Office, State On-line Billing	
Quality Indicators		Printing Services
Patient Satisfaction Surveys	Readiness Training	
Credentialing Verification service		
Developed Applications		
HIPAA Compliance	Staff Recruitment Program	
Managed Contracting		
Corporate Compliance		
Administrative Meetings		
Video Conferencing		

Phase Two Application Pool

Purchasing	Communications Support
Reimbursement	Financial Management
Decision Support	TeleHealth Projects
Patient Care Management	Patient Identification and Scheduling
Long Term Care	Clinical
Voice Over IP	Patient Interview / Entrance Screening

4.1 Application Descriptions

4.1.1 Shared Licensed Application

This category of applications refers to off-the-shelf-products that can be hosted on the RWHC server and shared by all RWHC members through the VPN. The Application Working Group must decide on the selection of these applications.

4.1.2 Shared Application Development

Shared application development for hosting on the RWHC VPN will require a process managed by the RWHC staff and worked out by the Application Working Group.

1. Cost Integration Solution
2. Corporate compliance
3. Managed contracting
4. HIPAA Compliance Workgroup Identified requirements

The true power of this concept is the joining of design minds to develop useful application to be hosted on the RWHC VPN. These applications have the potential for significant future value in the jointly developed applications being transported to other rural healthcare IT networks.

4.1.3 Communications Support

Voice over IP
Administrative Meetings

4.1.4 Administration Support

4.1.4.1 Transcription Services

4.1.4.2 Reimbursement

–Billings / Accounts Receivable
–Managed care

4.1.4.3 Financial Management

Accounts payable	Fixed assets
General ledger	Material Management
Payroll / Personnel	

4.1.4.4 Staffing and Schedule

4.1.4.5 Decision Support

Quality of care	Budgeting and forecasting
Cost accounting	Data Archiving

4.1.5 TeleHealth Projects

TeleRadiology	Consultations
TelePharmacy	TelePsychiatry
TeleSpeechTherapy	

4.1.6 Patient Care Management

4.1.6.1 Patient Identification and Scheduling

4.1.6.2 Long Term Care

4.1.6.3 Clinical

4.2 Education

RWHC can offer cost effective classes. One member may have trouble filling a class at particular time, but as group classes could be filled and offered at your facility and / or at staff homes.

This could satisfy educational requirements while still meeting critical staff needs. This application could be used to expand staff with classes offered at facility and on line at potential employees home. New staff are often are faced with scheduling obstacles making the transition difficult. Home training is a positive approach.

Types of classes that can be offered over the VPN

- 1.CE
- 2.Government Required
- 3.Application Training
- 4.MS Office Training
- 5.RWHC owned and hosted application.
- 6.Video conferencing classes from RWHC or member site
- 7.RWHC Internet/Satellite hosted classes

Education Procedures

- Working group pick classes
- RWHC Acquire and make available classes

4.3 Shared Direct Line Applications

The Radiology services provided via current dedicated direct lines could be a foundation of the VPN Demonstration Program. This application is currently in place with a loyal base of professional champions. The VPN solution will significantly save costs and add access flexibility to the users. The implementation of the Radiology application will also increase sites that may employ this application. Radiology services will be accessible in more remote rural areas.

5 VPN Services Options

The VPN service are divided into four sub-categories; Technical Expertise Services, Web Pages Support, System Services and Educational Services.

Technical Expertise Services	Web Page	System Services	Education Services
VPN Technical Support	Physician Web Pages	Printing Services	
	Medical Databases		
	Secure Email		
Technical Support	Medical Periodicals	Back-up Services	
	Medical Alerts		
	CME		
HIPAA Support	Seminars and Meeting Bulletin Board		
	Access to Hospital Systems		
	Community Wellness Web Pages		
	Medical Databases - Public		

5.1 Shared Technical Support

Technical expertise is recommended in four (4) general categories.

VPN technical support is oriented toward VPN management; network support and VPN help desk support.

General IT expertise is needed to help lead RWHC Members in the selection and implementation of IT individual and joint solutions. General technical support could be offered on ad hoc bases to RWHC Members.

Web Page Support

HIPAA Support

5.1.1 VPN Technical Support

Network Management

Network Support

VPN Help Desk Support

VPN Application Help Desk Support

5.1.2 Technical Expertise

IT support from RWHC should be oriented at two levels:

1. Technical Leadership Support
2. Technical Support

5.1.3 HIPPA Support

Shared Steps to Achieve HIPAA Compliance

Shared HIPAA Procedure Development

Shared HIPAA Training (HIPAA Team Members / Staff)

5.2 Web Page Support

Few WebPages begin to unlock the power of the Internet. A dedicated work group can provide this insight. RWHC collaborations could center on working groups for each of the Web Page types. Web Page developers with experience in healthcare organization Internet commerce

should be included in the team. Specialized working groups lead by RWHC technical support will provide a dedicated group of individuals working on a challenging task. Web Pages provide a portal to staff and consumers. Three levels of Web Pages could be utilized

1. Physician WebPages: Key Staff, A Physician Champion must be found to lead the Physician WebPages support.
2. Consumer WebPages: Key Staff, RWHC technical lead.
3. Facility Oriented WebPages: Key Staff, RWHC technical lead.

5.2.1 Physician Web Page

Knowledge Based Systems and Information

SHARED ACCESS COSTS

National Library of Medicine	Medscape	Healthfinder
MedWebplus	MicroMedex	Medline
AIDSLINE	BioethicsLine	HealthSTAR
Doctor Koop.com	Medical Matrix	University Med Sites

Consolidated Resource List

National and State Links	Proven Medical links	Periodicals
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National and Local Conferences and Seminars

CME Gateway

Alert Bulletin Board

5.2.2 Community Wellness

Patient Email Links

Pre/Post Procedure Information and Patient Education

Community Links

Human Services	Non-Profits
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Specialty Pages

Senior Pages	Diabetes Pages
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Patient Portal to Secure VPN

Patient Doctor Email	Patient Health Parameter Reporting
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RWHC Member Web Pages Support

5.3 Educational Services

6 RWHC VPN Program Cost Summary

Projected VPN Project costs are provided for four categories; Networking, Applications, Services and Evaluation costs.

Costing Goals

1. Low communication line costs
2. Low capitalization
3. Low application costs
4. Decreased cost per transaction

Costing Design Strategies

1. Shared communication line costs
2. Shared application acquisitions cost
3. Shared application development cost
4. Shared services cost
5. Shared hardware / software cost
6. Shared technical expertise cost
7. Grant funds for initial capitalization.

The following table summarizes the costs by function for Demonstration VPN project. More detailed data on how the costs have been established can be found in the report supplement.

	Monthly	Capital Cost
	\$32,680	\$110,000
Consumer Web Pages	\$2,985	\$28,000
Physician Web Pages	\$9,940	\$3,000
Continuing Education	\$5,520	\$3,000
Back-up	\$3,420	\$10,000
RWHC Developed Application	\$2,310	\$33,000
Shared Communication Lines	\$4,035	\$3,000
RWHC VPN	\$4,470	\$30,000
One Year Budget	\$392,160	\$110,000

6.1 VPN Networking Costs

The cost for installation of a RWHC VPN is based on estimates of VPN hardware and software configuration, connectivity cost and RWHC staff support.

The following table categorizes the software and hardware cost for two (2) VPN configurations. This represents the capitalization cost that would be required to implement a RWHC hosted VPN at RWHC.

RWHC Hosted VPN Configuration Options

Server	Firewall	Firewall Secure Software	Switch	Modules	Router	Router Software	Total
2,500	15,000	5,995	995	1,000	2,000	1,200	Cisco Option
2,000	10,000	2,800	995	1,000	2,00	1,000	Nortel Option

Monthly Cost Items

RWHC Staff Support:

Network Engineer Technical: \$8,500

Network Support Technician: \$4,500

Connectivity Costs:

T1 Internet connection: \$1,200

T1 line to affiliated organization: \$1,200

T1 line to affiliated organization: \$1,200

6.2 VPN Application Costs

The estimated costs for the application categories are shown in the following table.

	Monthly	Capital Cost
Consumer Web Pages	\$2,985	\$28,000
Physician Web Pages	\$9,940	\$3,000
Continuing Education	\$5,520	\$3,000
RWHC Developed Application	\$2,310	\$33,000

Monthly Cost Items

Consumer Web Pages:

\$2,500 IT technical support

\$500 connectivity/HW/SW

Physician Web Pages:

\$6,500 Periodical and Medical database access

\$500 CME gateway

\$500 connectivity/HW/SW

\$2,500 IT technical support

Continuing Education:

\$5,500 CME gateway

\$900 connectivity/HW/SW

\$1,600 IT technical support

RWHC Developed Application:

\$1,500 connectivity/HW/SW

\$800 IT technical support

6.3 VPN Service Costs

The estimated costs for the service categories are shown in the following table

	Monthly	Capital Cost
Back-up	\$3,420	\$10,000
Shared Communication Lines	\$4,035	\$3,000
RWHC VPN	\$4,470	\$30,000

Monthly Cost Items

Back-up:

- \$2,500 IT technical support
- \$800 connectivity/HW/SW

Shared Communication Lines:

- \$2,400 Direct line connections
- \$1,200 IT technical support
- \$500 connectivity/HW/SW

RWHC VPN:

- \$2,500 IT technical support
- \$1,500 connectivity/HW/SW

7 Cost Benefits Analysis (CBA)

The advantage of a Joint RWHC VPN over an individual member VPN are realized in the added value of shared lines, shared applications, shared equipment and shared technical expertise

Immediate cost benefits are shown relative to VPN connectivity options.

The cost benefits of additional IT applications and services available to facilities at no additional costs are intuitively obvious.

The intangible value of shared technical creativity for IT solution design and development is extremely significant.

General advantages and benefits of a RWHC VPN are summarized in the following observations.

1. Cost effective connectivity method: Wide bandwidth connections to all member organization through one Internet connection. Eliminates the need for multiple direct communication lines. Monthly communication cost can be significantly reduces with increased bandwidth and more efficient bandwidth utilization.
2. Security: Provides Internet Security capability to exceed HIPAA standards.
 - a. Authentication: The process by which a party proves identify to another. Authentication allows us to verify a user identity, as well as verify that data is coming from a trusted source. This includes authenticating an individual user as well as includes authenticate the host where the information originated.
 - b. Integrity: Integrity ensures that the data has not been modified during transmission.
 - c. Privacy: Protecting private information from eavesdropping. Encryption provides privacy by modifying data so another except the intended recipient cannot view it. The sender and the recipient each have keys that are used to encrypt and decrypt the information that is being shared.
 - d. Auditing: The single best tool for selecting failures, mis-configurations or internal/external attacks
3. Shared Capital Cost: The RWHC VPN implementation allows for development of one system that can be shared by all members. Versus each individual member making the same capital investment and acquisition of duplicate resource to implement the same level of networking capability.
4. Scalability: Provide growth to the number of sites and remote users.
5. Shared Applications/Services: IT solutions can be jointly purchased and developed by RWHC members.
6. Shared Technical Support: A shared technical RWHC staff would maintain shared systems, application and similar Web Page projects.
7. Remote Access VPN: VPN provides a more reliable and faster connection then dial-up.

8. Site-to-Site VPN: Connect corporate to branch office. Connect business partners.

RWHC VPN versus Individual Member VPN implementation options: The individual member VPN will provide cost savings in connectivity cost and allow for individual member control. The significant cost savings of shared applications and services will not be realized. The same capability could be provided in a joint VPN with shared costs.

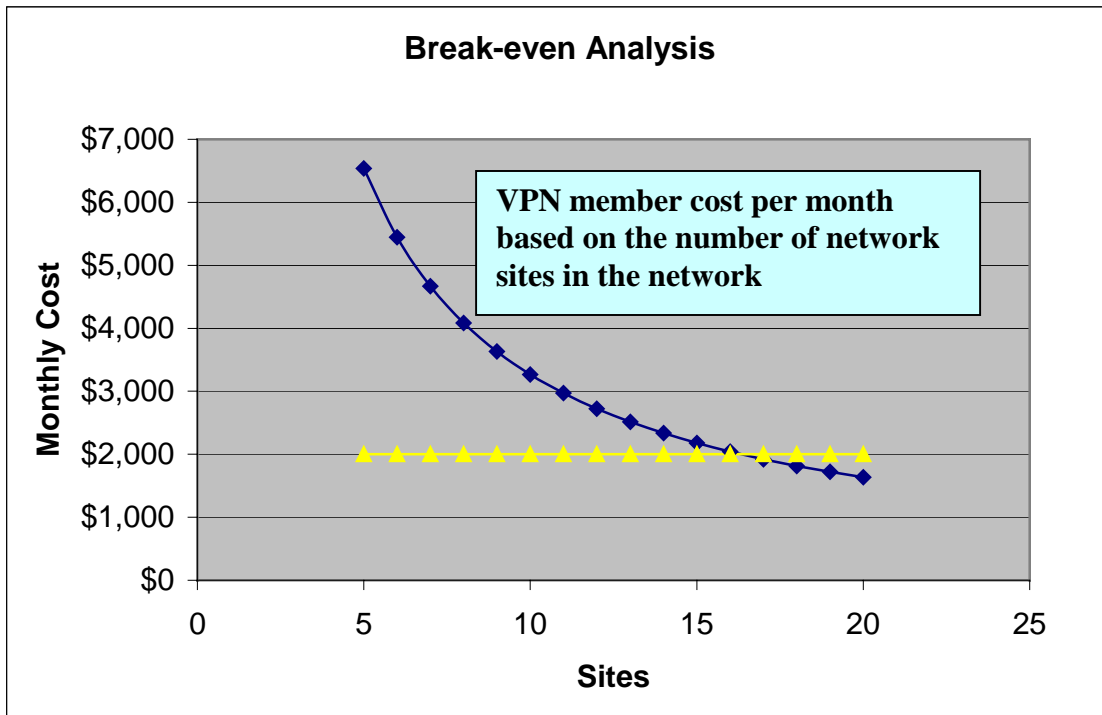
The RWHC VPN CBA was divided into three (3) categories; connectivity, applications and services

7.1 VPN Connectivity Cost Benefits

No Brainer

If sixteen (16) sites participate in a VPN Project, the cost per month would be \$2,000 per member. For an organization currently paying for two (2) T1 lines, this would be a breakeven for communication line costs alone. This does not include significant savings in resources, equipment, applications and added value from new joint VPN applications and services.

The following chart graphically demonstrates the connectivity breakeven point of the VPN implementation. This chart shows the cost of the full RWHC Demonstration Project, connectivity, application and service costs. The cost is based on monthly operating cost of \$32,700. It does not include the initial capitalization costs of \$110,00.



7.2 VPN Applications Cost Benefits

Individual CBA was attempted for each application and application category but was unsuccessful in creating any meaningful comparison for management review. A review of the identified applications must be conducted by the Application Working Group to determine which applications are of most value for implementation.

It is believed that the most potential for future value and cost savings comes from the joint development of VPN applications. This process has been budgeted \$33,000 with a \$2,300 month support line.

Sharing of joint training packages is believed to be an immediate win area. All members have defined a significant training need. Targeting basic training needs and sharing solutions among the members will be of cost effectiveness.

Expansion and upgrading current RWHC application is a significant value. Ore applications will increase the number of healthcare services available to RWHC members and costs effectiveness.

7.3 VPN Services Benefits

Specific services have been defined for initial implementation of shared direct line applications such as: system back-up services and radiology services. No specific cost benefits analysis was successfully conducted. Implementation of existing application on the RWHC VPN will allow for immediate savings of a current expenditure by some RWHC members and add a needed service to those for those RWHC member which need the implemented services.

7.4 Requirements vs. Application/Services Analysis

The following table matches identified requirements against potential applications and services.

	VPN Connectivity	Physicians WebPages	Consumer WebPages	Community Wellness WebPages	Communications Support	Integrated Healthcare Information System	Decision Support	Reimbursement	Financial Management	Distance Learning	Business Teleconferencing	Patient Identification and Scheduling	TeleRadiology	TelePharmacy	Consultations	IT Support
•Improved scheduling services						X										
•Access to information and services from home	X	X	X	X	X	X					X					
•Improved clinical communications	X				X	X					X		X	X		
•Improved links to physicians	X	X	X	X		X					X		X		X	
•Clinical information systems	X					X	X	X	X							
•Monitor home healthcare data	X	X														
•Improve links to pharmacies	X					X								X		
•Allow consumers to be better informed of their healthcare			X	X												
•Posting healthcare information for consumers			X	X												
•Improve communications between physicians and patients			X	X												
•Monitor patient satisfaction after visits			X													
•Educate patient before, during and after treatments			X	X												
•Insurance eligibility						X		X	X							
•Processing claims						X		X	X							
•Insurance reimbursement						X		X	X							
•Improve productivity						X		X	X							
•Reduce costs	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
•Financial applications						X	X	X	X							
•Electronic interchange to suppliers	X								X							
•Bridge to other information systems	X	X	X	X	X	X					X					X
•HIPAA Compliance Support	X	X				X										X
•Email	X	X														X
•Online research	X	X	X	X												X
•Continuing Education	X	X	X	X						X						X

8 Project Plan

8.1 Planning and Feasibility Study Phase (Phase One)

There are many types of VPN implementation each with its own specific technology requirements and benefits to the users. The first step was to define the critical project requirements and to become familiar with the network members.

Preliminary Site Visits: Short site visits were conducted to become familiar with network member's facilities and network requirements. Research will be conducted to become familiar with local Telecommunication providers. A search will be performed to identify all other local network organizations, either VPN or WAN architecture. Collaboration with similar networks has proven beneficial in other network implementations. For example, network connections could be shared over an educational ATM network allowing for either a VPN or WAN implementation. This type of network collaboration has the advantage of being extremely attractive to many funding organizations. Site surveys and interviews were conducted to include Member sites, Potential Network Member Coordination and Telecommunication providers.

Definition of Network Implementation Funding Options: At the start of the program funding options were explored. This will be performed through interviews with current staff members and coordination with personal contacts in the rural healthcare oriented community. The potential of additional network collaborations (i.e. between educational networks) will be explored to increase the likelihood of funding source identification and approval.

Definition of Network Top Level Design Options: Potential network designs will be developed for cost analysis and reporting. Analysis and design work will include both VPN options, as well as a potential highbred. The highbred may include a combination of VPN and WAN, with linkages to other network collaborations. The intent is to design and develop the most efficient and cost effective network for the rural healthcare providers.

8.2 RWHC VPN Demonstration Phase (Phase Two)

PURPOSE: Demonstrate the cost effectiveness of a representative number of services/applications using VPN architecture.

A phased implementation is recommended. A representative number of applications and services have been selected for implementation during the demonstration VPN project. A demonstration project, as a proof of concept, will help to sell the value of the network philosophy to all RWHC members.

8.2.1 Program Management

A demonstration project is outlined in this section. A MS Project file is provided to help detail a one-year Demonstration Project. A more detailed project plan is provided in the report supplement.

ID	Task Name	2002				2003			
		Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2
1	Phase "One"	█		█					
9	VPN Decision		█	█	█				
13	Phase Two			█					
14	Establish VPN Teams			█	█	█	█		
19	Network Team			█	█	█	█		
20	VPN Architecture			█	█	█	█		
24	Define External Line Connections			█	█	█	█		
30	Application Team			█	█	█	█		
31	Off the Self Application Selection			█	█	█	█		
36	Education			█	█	█	█		
47	Joint Application Development			█	█	█	█		
52	Web Page Design and Development			█	█	█	█		
65	Services Team			█	█	█	█		
68	Evaluation Team			█	█	█	█		

8.2.2 RWHC VPN Program Staff

The RWHC VPN plan is based on 2.50 FTE. One full time senior IT professional, 0.25 administration support and 0.25 program management support.

Senior IT Professional: Salary, \$75,000, \$45 per hour charge rate.

IT Technician: Salary, \$41,600, \$25 per hour charge rate

RWHC Administration Staff: Salary, \$30,000, \$20 per hour charge rate.

RWHC Program Management Staff: Salary, \$75,000, \$45 per hour charge rate.

8.2.3 RWHC VPN Working Group Structure

A Working Group team structure is suggested. A recruitment of Team Members from all RWHC members is important.

A Professional Champion in each of the working groups must be identified and nurtured. The Professional Champions are needed to help bring others on board and help acquire funding.

8.2.4 Innovation

A shared VPN will be a unique application among the healthcare networks throughout the country. There are a number of shared WAN healthcare architectures (i.e. Michigan, North Carolina, and Nebraska). VPN architecture will prove to be the more cost effective and versatile design.

8.2.5 Transportability

Following a Demonstration Project the RWHC VPN Model can be accomplished throughout the country. The connectivity issue will be dependent on access to reasonably price wide bandwidth Internet access. This can still be a challenge in remote/wilderness areas. Satellite and wireless ISP communication methods may prove to be usable solutions in the more remote area.

9 Funding Options

Funding strategies are based on the basic premise that the VPN architecture is a sustainable cost effective implementation. The network will demonstrate cost savings based on current operating costs. The RWHC VPN is a unique IT based collaborative network model which can be a proving ground for an IT network architecture to be replicated in other rural healthcare environments. This unique IT VPN network model provides critical access to rural citizens at risk for needed healthcare services.

RWHC Network Member Contributions

Member financial contribution is possible and justifiable based on the following cost savings factors.

Direct cost savings: Cost savings from reduced communication line costs

Indirect cost savings: Additional healthcare application provided to rural healthcare facilities.

Intangible cost savings: Providing additional communication between healthcare provider and patient through access to customers through the Internet.

Financial Support from Affiliated Organizations

Currently affiliated organizations (i.e. Gunderson) are paying **10 of thousands of dollars each month** to maintain T1 lines throughout RWHC member organizations. The VPN solution will save them many thousands of dollars each month. This should be an easy sell to these larger healthcare providers.

Unique Grant Support Strategies

Grant sources are available for distinct healthcare needs. The RWHC VPN project provides unique solutions for a number of the targeted healthcare need areas. Initial capitalization can be searched for based on these healthcare needs.

Increase children immunization rates: Increase accessibility to state immunization registry applications via the Internet to rural healthcare providers.

Unique rural healthcare provider IT collaboration: Funding is available to help bring IT healthcare solutions to the under served rural citizen.

Digital divide issues: The elderly and physically challenged populations are at risk for high cost health care needs. IT healthcare solutions can help reduce these costs and provide needed healthcare were it currently is not provided.

Rural physicians can be isolated from healthcare technologies, information and peer consultations. The RWHC VPN is a secure and cost effective portal to reduce the isolation of the rural physician.

Critical Staff Training: The critical staff training application can prove to a significant value to many healthcare organizations both in rural and urban area. Funding of the joint development of the training program could be sought from various organizations. The training application is of value to healthcare, education, employment and human service organizations.

10 Site Survey Summary

Site survey information should only be used as a guide to understanding what can be and what should be implemented within the VPN design.

Top-level assessment of site IT status was conducted. The ranking was subjective and used to help determine network needs and capabilities prior to the VPN design activities.

IT Sophistication: IT sophistication was determined for each site. IT sophistication was a relative judgment of the RWHC members IT capabilities relative to staffing, hardware, software, connectivity and corporate IT philosophy.

Access to connectivity options: Access to cost effective telecommunication service options was an assessment of each organization's local telecommunication capabilities. Telecommunication options are changing very quickly, many new options are being made available to the rural communities. This assessment must be considered a perishable evaluation.

10.1 IT Capabilities Overview

Data in tables in the report supplement summarizes the RWHC Member levels of IT implementation. Facility size (Hospital Beds and Annual Revenues) is compared to number of workstations, servers and IT Staff. Basic associated relative levels are observed when the figures are plotted against each other.

10.2 Connectivity Requirements Overview

Each RWHC member was interviewed to identify external communication lines from their facilities. Additionally, representatives of local school districts, Economic Development Corporations, ISPs, telephone companies, Badger Net and the University of Wisconsin were interviewed to determine if any networking resources could be identified.

Education Partners: Numerous unique and powerful educational networks were identified. All of which were restricted to "for profit" organizations.

Telecommunication Partners: All telecommunication service companies were capable and willing to develop Wide Area Network (WAN) solutions.

Community Telecommunication Project Partners: Several community-networking projects were identified but were education oriented.

Supplement 1: Demonstration Phase Project Plan

Draft MS Project outline of the proposed Demonstration Phase VPN Project.

Supplement 2: Cost Benefits Analysis Data

MS Excel files contain a working spreadsheet to allow for dynamic analysis of changing input data.

Cells in “yellow” are represent key parameter, which can be modified. The spreadsheets are inter-linked to allow for experimentation with cost and configuration options. One change in one of the spreadsheets will make the associated changes throughout.

There are nine associated spreadsheets.

- Comparison
- Summary
- Consumer Web page
- Physician Web page
- Continuing Education
- VPN
- Backup
- Communication Lines

Supplement 3: Site Survey Information Data

The supplement contains tables which summary data from the site survey and requirements analysis. This information is perishable and much is over six (6) month old.

Supplement 4: TelePharmacy Application

A draft TelePharmacy Project Outline and draft for a grant application.

Supplement 5: Final Briefing Slides

The supplement contains a copy of the final report briefing slides.

Supplement 6: Demonstration RWHC VPN Options

Supplement 1: VPN Demonstration Project

Draft MS Project outline of the proposed Demonstration Phase VPN Project.

Supplement 2: Cost Benefits Analysis Data

MS Excel files contain a working spreadsheet to allow for dynamic analysis of changing input data.

Cells in “yellow” are represent key parameter, which can be modified. The spreadsheets are inter-linked to allow for experimentation with cost and configuration options. One change in one of the spreadsheets will make the associated changes throughout.

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- Comparison

- Summary

- Consumer Web page

- Physician Web page

- Continuing Education

- VPN

- Backup

- Communication Lines

Supplement 3: Site Survey Information Data

The supplement contains tables which summary data from the site survey and requirements analysis. This information is perishable and much is over six (6) month old.

Subjective IT Sophistication Ranking

External Connectivity

Direct Line Connectivity

Facility Application Overview

RWHC Member	IT Sophistication	Connectivity Options
Berlin Memorial Hospital, Berlin	8	
Black River Memorial Hospital, Black River Falls		
Columbus Community Hospital, Columbus		
Memorial Hospital of Iowa County, Dodgeville		
Adams County Memorial Hospital, Friendship		
Grand Regional Health Center, Lancaster		
Mile Bluff Medical Center, Mauston		
The Monroe Clinic (& Hospital), Monroe		
Southwest Health Center, Platteville		
Devine Savior Healthcare, Portage		
Reedsburg Area Medical Center, Reedsburg		
Ripon Medical Center, Ripon		
Shawano Medical Center, Shawano		
Stoughton Hospital, Stoughton		
Vernon Memorial Hospital, Viroqua		

External Connectivity

Member	Email Accounts	Workstations with Internet Access	Internet Access Bandwidth	Internet Access Cost	Internet Access Provider
Berlin Memorial Hospital, Berlin					
Black River Memorial Hospital, Black River Falls					
Columbus Community Hospital, Columbus	60	50	1,400,000	1400	PowerWeb / Ameritech
Memorial Hospital of Iowa County, Dodgeville					
Adams County Memorial Hospital, Friendship	53	47	56,000	40	Marquette-Adams Telephone Co-op
Grand Regional Health Center, Lancaster					
Mile Bluff Medical Center, Mauston					
The Monroe Clinic (& Hospital), Monroe					
Southwest Health Center, Platteville					
Devine Savior Healthcare, Portage					
Reedsburg Area Medical Center, Reedsburg					
Ripon Medical Center, Ripon	56	56	512,000	1,092	Quest
Shawano Medical Center, Shawano					
Stoughton Hospital, Stoughton					
Vernon Memorial Hospital, Viroqua					

Direct Line Connectivity

Member	Type of Connection	Bandwidth	Monthly Costs	Application	Utilization Levels
Berlin Memorial Hospital, Berlin					
Black River Memorial Hospital, Black River Falls					
Columbus Community Hospital, Columbus	None	None	None	None	None
Memorial Hospital of Iowa County , Dodgeville					
Adams County Memorial Hospital, Friendship	None	None	None	None	None
Grand Regional Health Center, Lancaster					
Mile Bluff Medical Center, Mauston					
The Monroe Clinic (& Hospital), Monroe					
Southwest Health Center, Platteville					
Devine Savior Healthcare, Portage					
Reedsburg Area Medical Center, Reedsburg					
Ripon Medical Center, Ripon	WAN	64,000	316	LIS Multi site set-up	LCN
Shawano Medical Center, Shawano					
Stoughton Hospital, Stoughton					
Vernon Memorial Hospital, Viroqua					

Facility Application Overview

Member	System Purpose	System Name	Host Hardware	Users	Use	System Cost	Maintenance Costs
Berlin Memorial Hospital, Berlin							
Black River Memorial Hospital, Black River Falls							
Columbus Community Hospital, Columbus							
Columbus	Hospital Information System	CPSI		64			
Columbus	Lab System	CPSI		64			
Columbus	Pharmacy System	CPSI		64			
Columbus	Radiology System	CPSI		64			
Columbus	Medical Database	CPSI		64			
Columbus	VPN						
Columbus	Email	Mail.cch inc.com					
Memorial Hospital of Iowa County, Dodgeville							
Adams County Memorial Hospital, Friendship							
Friendship	Hospital Information System	Dairyland	IBM RS6000	32		\$185,000	\$22,000
Friendship	Hospital Pharmacy Management System	PDS – Pharmpro	Windows NT V4.0 Server	2		\$11,000	\$2,000
Friendship	Telephone	Fujitsu Starlog		125			
Friendship	Email / WebPages Hosted	Vendor		50			200
Friendship	Nursing Home Software	American Data	Novell 5.1 Server				
Grand Regional Health Center, Lancaster							
Mile Bluff Medical Center, Mauston							
The Monroe Clinic (& Hospital), Monroe							
Southwest Health Center, Platteville							
Devine Savior Healthcare, Portage							
Reedsburg Area Medical Center, Reedsburg							
Ripon Medical Center, Ripon							
Ripon	Hospital Information System	HBOC	AS400	100			
Ripon	Lab System	SCC	IBM RISC 6000	4	3750	103,000	30,144
Ripon	Hospital Pharmacy Management System	Health Care System	Novel Server	4	6000	24,000	6,200
Ripon	Radiology System	JPACS	Windows 98 PC	4			1440
Ripon	Telephone	Lucent/avaya					
Ripon	VPN	Cisco Pix	NT Server	100			

Member	System Purpose	System Name	Host Hardware	Users	Use	System Cost	Maintenance Costs
Ripon	Email	Exchange Server	N Server	70		20,000	
Ripon	Web Hosting	Dotnet					180
Shawano Medical Center, Shawano							
Stoughton Hospital, Stoughton							
Vernon Memorial Hospital, Viroqua							

Supplement 4: TelePharmacy Grant Application

.1 Goals

Create hardware and software application allowing for a licensed and registered pharmacist to provide needed pharmaceutical services remotely at multiple clinics. This will help overcome the critical shortages of RPh and allow for pharmacies to be established at clinics with low transaction numbers, which are currently not financially viable due to low income potential.

The goal of this project is to respond to critical pharmaceutical health care access issues being created by the rarity of license pharmacists, the needed pharmaceutical services including responsible drug therapy, quality health care and health information and cost effective, timely prescription delivery to residents of the outlying areas of the service area.

This project will assure the continuation of pharmaceutical care and improve the access of care to remote rural citizens. The TelePharmacy Outreach Service program (**TelePharmacy**) will allow one pharmacists to dispense medication at multiple remote clinics, gather needed information before medications are dispensed, and to provide quality consultations/patient education from one location many miles away from the remote clinics.

Develop a system and procedure, which will be financially self sustaining and can be duplicated at other locations where distance creates the challenge for pharmaceutical service providers.

.2 Activities

Grant funds will be used for implementation of a transition project to develop alternative health delivery capabilities, providing professional pharmaceutical services in the currently un-served areas. Interactive technology linkages between the remote dispensing sites and the Main Pharmacy will be established. On site staff will be trained in both the technology and appropriate procedures to ensure the provision of quality services and off-site dispensing of prescription medications.

.3 Service Area

.4 Facilities

In addition, very little infrastructure exists. The road system is comprised of poor, many unpaved, surfaces. Emergency transportation services are available but average response/run time can exceed one hour . No public transportation is available in the service area. Further, the long harsh winter weather can make travel extremely difficult, if not impossible between the end of October and late April. Annual snowfall exceeds 100 inches and temperatures can drop to -60F.

.5 Services

The TelePharmacy system will allow for a single pharmacist to provide pharmaceutical services to multiple remote clinics from a centralized location. The single pharmacist will:

- a. dispense medication at the remote site with the help of Pharmacy Technician, at the remote site and
- b. provide pharmaceutical counseling to the patients at the remote site via video and audio links.

To provide the residents of the remote service area with responsible drug therapy, quality health care and health information, and cost effective, timely prescription delivery by will utilizing TelePharmacy methods with a specific formulary for off-site dispensing of prescription medications.

Significant ground work has already been completed for the TelePharmacy concept. TelePharmacy concept feasibility study is has been conducted at Northern Itasca Healthcare Center in Bigfork, MN. This project has proven that the TelePharmacy concept can work in remote rural area.

.6 Unique Health Care Needs

Health care needs can be unique for the elderly population. They require significantly more health care services; often they have difficulty understanding the required drug regiment requirements and have difficulty getting to the pharmacy to get the needed medication.

.7 Risk

The service area like many rural communities in America, are struggling to maintain and improve necessary health care services. The pharmaceutical services must self-sustaining. The rural clinics do not generate sufficient business to support a full time pharmacist.

.8 Access Concerns

Pharmaceutical services are critical for all the citizens of rural America but doubly so for the elderly citizens. The citizens need to have access to pharmaceutical caregivers that understand the unique needs and perceptions of the rural citizens.

Availability of highly trained and licensed Pharmacists is disappearing rapidly. The rarity of rising costs of RPh makes it difficult to compete with urban salaries (National average over 90K annually). The rural pharmacy typically averages 40 prescriptions daily. This along with the front store revenues is not sufficient to provide a competitive salary. This means the death of the rural pharmacies in North Dakota.

.9 Pharmaceutical Supply Concern

Many medications need to be protected from extreme temperatures and mail service cannot provide this assurance in rural remote areas. Liquids (antibiotics, ophthalmics, otics, lotions, etc.), aerosols (inhalers) and insulin are prime examples of medications that can lose their efficacy when left unprotected. Even if

mail service provides a timely and temperature protected delivery, adverse weather may prevent the patient from getting to their mail delivery site and, thereby, expose their medications to prolonged heat or cold. Elderly persons in particular may experience great anxiety if medications are lost or delivery delayed.

.10 Health Education And Wellness Concerns

With demographic projections repeatedly predicting the continuing growth of our local aging population, the need to provide quality pharmaceutical care throughout the life cycle becomes increasingly important. With an increase in the number of prescriptions, an increase in new products, and new information regarding drug therapies, there is an increased likelihood of drug reactions, interactions, and adverse events. With no consistent or central pharmaceutical care, vital and important information may not be available to the patient or their care giver, and effective drug utilization reviews will not take place.

.11 Distance

Clients of remote clinics must travel long distance to receive needed pharmaceutical services. A one way trip of 40 miles is the distance to get to a local pharmacy. This distance can be an insurmountable barrier for many people.

.12 Extreme Temperatures

In addition to the distance is the extreme cold that can be experience for a good percentage of the year. These cold temperatures make it impossible to utilize mail services because the extreme cold temperatures can affect many medications.

.13 Pharmacist Resources

Licensed and registered pharmacists are rare and expensive staffing resource. Small remote clinics do not have the volume/number of subscriptions to provide the cash flow needed to support the cost of a pharmacist. The TelePharmacy system allows one pharmacist to service multiple clinics, thus the cost of the pharmacist can be shared among multiple clinics of large geographical areas.

.14 Cost Effectiveness

The initial set-up costs will be the largest portion of expenses for this project. Once **TelePharmacy** is fully operational, the costs will be minimal and the returns immeasurable. There will be little, if any, additional staff needed; implementation is anticipated to involve utilizing existing clinic and pharmacy staff. The training requirement is minimal: approximately two days of working with the pharmacy staff to familiarize the off-site employee with pharmacy procedures.

The system design utilizes low cost transmission vehicles and off the self computer hardware. This is critical to assure low cost per transaction.

It is difficult to assign a dollar value to the benefits of the TelePharmacy outreach services program, but quality pharmaceutical care is known to prevent adverse events with interventions due to prospective and retrospective drug utilization review. Patients with known drug allergies will not be given potentially harmful medications, medications that can cause serious interactions with other medications will not be dispensed until the prescribing physician reviews the interaction, and proper therapy instructions and follow-up will increase patient compliance and increase likelihood of positive outcomes and significant dollar savings within the total health care system.

.15 Future Potential

Implementation of the proposed TelePharmacy Application will create a service structure which will provide a positive cash flow, making it self sustaining system. Positive cash flow can be used to support other health care services within the clinic.

.16 Provision Of Quality Pharmaceutical Services

The professional mission of pharmacy is pharmaceutical care, or the providing of responsible drug therapy for the purpose of achieving definite positive patient outcomes. Pharmaceutical care is a patient centered approach to pharmacy practice that goes beyond the role of prescription product dispensing to that of a health care service provider. The pharmacist assumes the responsibility for meeting drug related needs by identifying, resolving, and preventing drug therapy problems. Patient service will include but is not limited to patient consultation of drug therapy issues, information collection, identifying drug related needs, assessment of drug therapy to identify any active or potential problems, to develop goals for therapy and establish a monitoring system, to provide education or recommendations about patient's drug therapy including instructions for proper use of medications, demonstration of techniques or devices, referrals to additional appropriate sources or professionals, and patient follow-up to assure drug therapy goals are being met and patient outcomes are evaluated and documented.

The spirit of the people in Northern America is to pull together to find solutions for their problems. **TelePharmacy** technologies provides a tool for the area health care providers to be able to efficiently work together to create a methodology to serve the needs of their community.

TelePharmacy will provide a tool to increase communications and lower cost of quality pharmaceutical services.

TelePharmacy will provide pharmaceutical care and services where none currently exist, by allowing patients and health care providers to have one-on-one patient education and consultations with a registered pharmacist at the outreach clinic site via interactive technology, thus improving quality of care as well as cost effectiveness of service. The quality of medications delivery will also be greatly improved through local dispensation of prescriptions, eliminating the risk of loss, delay of delivery, and exposure to temperature extremes.

.17 TelePharmacy Procedures

The following figure graphically illustrates the **TelePharmacy** concept of operation. The basic concept is to allow the remote Pharmacist to supervise the activities of the remote health care staff and to consult with the remote pharmacy patient via video, audio and data transfer links.

The following figure graphically illustrates the **TelePharmacy** concept of operation. The basic concept is to allow the Pharmacist to supervise the activities of the remote staff and to console the remote pharmacy patient via video, audio and data transfer links.

Basic operational description:

- 1.) make contact with the patient
- 2.) accept the prescription
- 3.) enter initial patient information
- 4.) transfer prescription and new patient data to the Pharmacist
- 5.) once authorized by the Pharmacist the prescription will be filled
- 6.) forward prescription information for insurance processing
- 7.) a picture of the drug bottle and the patients drugs will be sent the Pharmacist for verification
- 8.) label data will be received from the Pharmacist and adhered to the patient's drug container
- 9.) the patient will then be consulted by the Pharmacist via audio and video links

.18 Concept Of Operation

A. When a physician first writes a prescription, a member of the pharmacy staff will log on to the remote pharmacy dispensing computer and access the patient's profile. Any missing information needed for assessment of drug therapy will be obtained from the patient. The information gathered will include but is not limited to: patient's name, address, telephone number, date of birth, gender, disease states, known allergies/drug reactions, concurrent medications, and billing information.

B. The second step in pharmaceutical care is to assess the patient's total drug therapy, including concurrent and/or potential problems. Questions to aid in the assessment include: Does the patient need this drug?, Does the patient have a medical condition for which the drug has been prescribed or suggested?, Is this drug/dosage form the most effective and safe for this patient?, Is this dosage the most effective and safe for this patient?, Will any drug interactions impair efficacy or safety?, and Can the patient follow this drug regimen? Although this review process can be accomplished utilizing a computer, any questions which may arise or any potential problem the computer may flag will be manually checked by the by pharmacist at the home pharmacy. Any issues will be resolved by discussing the matter with the patient and/or patient via the interactive TelePharmacy video conferencing workstation and by consulting current reference available to the pharmacist which will include, but are not limited to, Facts and Comparisons, USP/DI, Merck Index, Pharmacotherapy, Remington's Pharmaceutical Science, and Medline.

C. The pharmacy staff member will prepare the medication for dispensing and present the medication, the stock bottle, and the original prescription via direct interactive video to the pharmacist at the home pharmacy. The pharmacist will then "initial" the prescription by entering

a note in the prescription file. Copies of the original prescription can be faxed to the home pharmacy for filing purposes. A complete label and patient information leaflet will be printed at the remote site and the prescription made ready for dispensing.

D. The next step is to provide needed and valuable information to the patient at the time of dispensing. An offer to counsel the patient about their medications will be made to all patients. If the patient requires counseling, the pharmacist could interact with the patient either by direct interactive video or by telephone depending upon the desires of the patient. The information provided will include the name and description of the medication, the dosage form, dose, route of administration, duration of therapy, intended use and expected results, any special directions, common severe side effects and therapeutic contraindications, self-monitoring techniques, proper storage, refill information, what to do in the event of a missed dose, and any other relevant comments to ensure safe and effective therapy. Counseling will include demonstrations of proper administration technique when appropriate.

E. When the pharmacy receives a request for a refill, the pharmacist or technician will inquire about the outcomes of the patient's therapy. Using open-ended questions such as, "Tell me about any changes, good or bad, since you started on this medicine.", "How are you feeling?", or "Have you noticed any side effects?" will generate more information. If there appears to be over- or under-utilization, correct usage will be reinforced.

F. Information that is pertinent to the ongoing pharmaceutical care of each patient shall be documented on the computer in the patient's profile or on a written patient's profile if needed. This information will include, but is not limited to, the pharmaceutical needs of the patient, services provided, therapeutic outcomes, and interventions or interaction with other health care providers.

G. All information regarding patients and/or their pharmaceutical care will be totally confidential

Supplement 5: Final Briefing Slides

Supplement 6: Demonstration RWHC VPN Options

Two options have been provided for review. Option “One” represents the report Demonstration Project costs. Option “Two” is a stripped down program, data can be found in the Excel spreadsheet name CBA RWHC VPN Option 2. The following table summarizes the top level costs. Further options can be easily created by modification of the “yellow” cells in the Excel spreadsheet.

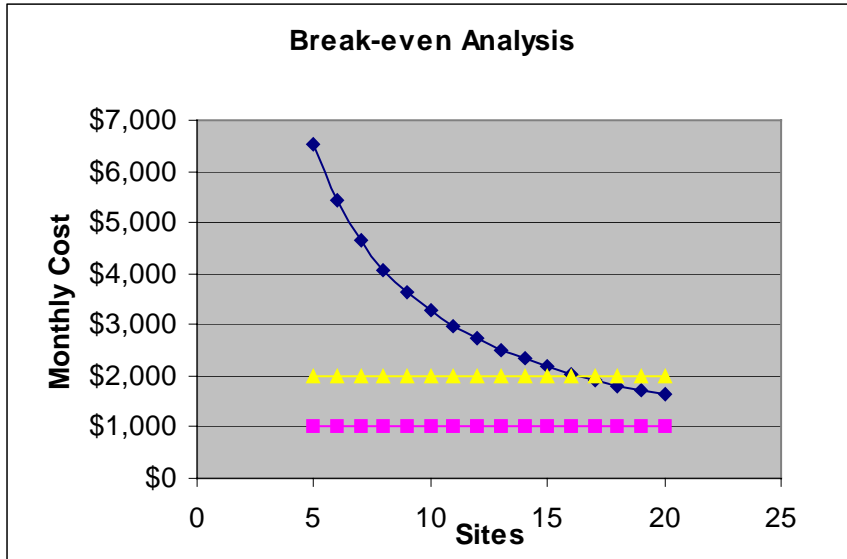
	Operating Costs	Capitalization Costs	Nr of Sites to met \$2000 a month breakeven point
Option “One”	\$392,160	\$110,000	15 site
Option “Two”	\$240,540	\$72,000	10 sites

	Monthly	Capital Cost
	\$32,680	\$110,000
Consumer Web Pages	\$2,985	\$28,000
Physician Web Pages	\$9,940	\$3,000
Continuing Education	\$5,520	\$3,000
Back-up	\$3,420	\$10,000
RWHC Developed Application	\$2,310	\$33,000
Shared Communication Lines	\$4,035	\$3,000
RWHC VPN	\$4,470	\$30,000
One Year Budget	\$392,160	\$110,000

	Monthly	Capital Cost
	\$20,045	\$72,000
Consumer Web Pages	\$0	\$0
Physician Web Pages	\$4,540	\$3,000
Continuing Education	\$3,520	\$3,000
Back-up	\$2,520	\$10,000
RWHC Developed Application	\$2,310	\$23,000
Shared Communication Lines	\$4,035	\$3,000
RWHC VPN	\$3,120	\$30,000
One Year Budget	\$240,540	\$72,000

The two charts show the breakeven point for the two options.

Option "One"



Option "Two"

