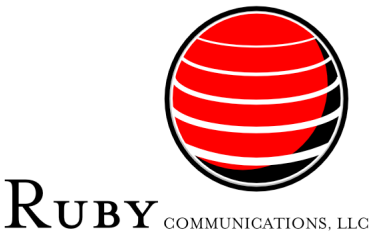
Telecommunications Technology Assessment

March 12, 2006



1 INTRODUCTION

1.1 Background Information

Hospital, an independently owned, not-for-profit, community hospital has been serving people in Douglas County since 1923. The 150-bed, hospital provides diversified health care services including Women's Health; Surgical Services; Outpatient Services, such as – laboratory, imaging, and health education delivered by over 200 physicians and surgeons committed to medical excellence and to taking good care of their patients and families.

In an age of hospital mergers and large health care systems, our client remains true to its roots. Proudly independent, an uncommonly personal community hospital dedicated to providing high-quality, compassionate care. To ensure the ability to remain as such, they have set forth the following long and short term objectives:

Financial

- Achieve performance that ensures the long term viability and independence of the hospital
- Achieve an operating margin of 4%
- Achieve the ratio's of a Moody's A rated hospital
- Begin to benchmark productivity and establish goals

Quality

- Provide service and quality of care that exceeds customers expectations and standards within the industry
- Achieve the 90th percentile in all Press-Ganey Groupings
- Achieve an overall 75% very good to excellent response rate
- in the biennial medical staff survey
- Identify key clinical areas to improve practice as compared to nationally
- developed standards

Hospital Services

- Implement new services and enhance existing services to improve the health of the community or the financial performance of the hospital
- R&D new services including nontraditional services
- Identify and evaluate the essential services that define a community hospital
- Evaluate the top five and bottom five current services based on operating margin

Medical Staff

- Develop a medical staff whose skills, services, leadership are second to none ensuring an appropriate mix and number of physician specialties
- Maintain and implement the 'Manpower Plan' related to succession planning, growth, and specialty mix
- Identify and develop medical staff skills/leadership
- Develop primary care presence in the northern part of our service area

Advocacy

- Ensure that the issues and concerns of the hospital are heard at the appropriate levels of government
- Administration will become more engaged in advocacy at the local and state level
- Trustees will use their contacts and influence to advocate on behalf of the hospital

Competitive Environment

- Maintain an awareness of what competitors and partners are doing and planning in our service area
- Meet with key administrative people from our competitors
- Analyze market share trends for key hospital services within the hospital's primary and secondary service area
- Work with our community health partners to create a customer friendly, seamless delivery system for all of our patients

1.2 Executive Summary

To support this mission, Hospital wants to further optimize its internal and external communications delivery technology. To determine an approach to further enhance the delivery of services, The hospital recognizes the need to understand the existing technology and systems currently in use within the hospital, and to explore what new or more efficient technologies may be available that could support this mission. Our client contracted with Ruby Communications to perform an assessment and gap analysis.

The assessment reviewed the current technology environment, focusing on the goal of building upon what is in place, minimizing cost, reducing risk and identifying equipment and services that improve the flow of information between physicians, staff and external service providers while enhancing access to health care services. Through the discovery and interview process the comments were consonant.

2 Anecdotal Information

According to an article in *The Journal of Nursing Administration,* "medical staff loses almost 900 hours a year due to paging delays, another 700 hours annually is lost to waiting on hold and more than 500 hours per year answering calls then tracking people down."[1] This article was written in 1995, one can only imagine what the number of hours is now in 2004 with the advancement in technologies and speed of information flow in today's healthcare environment.

In several stakeholder interviews, the question was asked, "How much time do you spend 'circling' trying to respond to pages?" The answers ranged from 30 minutes to 1.5 hours. If we use the assumption that on average Nursing Supervisor/Director is paid $30.00 per hour and there are 23 nursing directors it could be said that $690.00 dollars per day or $47,840 annually (based upon 2080 work hours) is wasted due to inefficient communication. This doesn't even

[1] The Impact of Wireless Telecommunications System on Efficiency" The Journal of Nursing Administration, Volume 25, Number 6, June 1995

begin to take into consideration the impact on Social Services, Float staff, Bio-Med, Plant Operations, Administration, ER Staff and others, just the Nursing Directors…

To improve staff communication, the solutions must be simple and scalable to manage the increased demand for instantaneous communication, and be supportive of future advanced technologies that become available that are beneficial to hospital. To avoid interruptions in service the implementation must be efficient and planned.

The assessment process focused on four key areas:

- Telecommunications Equipment
- Telecommunications services
- Paging – Internal and External
- Cellular Services

Additionally, Nurse Call and mobile communication devices (SpectraLink Telephones) were also made note of and included as part of the overall telecommunications assessment. Per conversations with our lead stakeholder the assessment provides a general overview of the current configuration and a future recommendation is not included.

2.1 Assessment Objectives

1. Identify the means to provide consistent clear communications between physicians, staff, patients and suppliers.
2. Outline a plan to move from current technology base to enhanced technology base.
3. Minimize costs through the utilization of existing technologies and equipment where applicable.
4. Provide financial estimations for strategic planning purposes.

2.2 Information Collection

Ruby collected the following information and documentation. In some cases, Ruby reviewed previous proposals and pricing information. Using this documentation Ruby created a snapshot of the existing environment.

- Telecommunications system configuration records
- Paging system documentation
- Paging service bills
- Telephone bills
- Traffic Reports
- Vendor contact lists

2.3 Stakeholders

In the discovery process, Ruby Communications met with several key hospital stakeholders to develop a baseline of the technology in use. to thoroughly understand how these systems are being used and the business needs.

These individuals represented functional areas within the hospital, each providing input for core service delivery departments:

- Director Emergency Department
- Vice President Finance
- Business Office Director
- Director Med/Surgery Nursing
- Vice President Patient Care
- Director, Information Technology
- Supervisor Plant Operations
- Bio-Med Technician

2.4 Equipment Vendors and Service Providers

The needs assessment included informational interviews with the following key vendor partners.
(See table on page 5)

	Contact	**Service/Equipment**
Qwest Communications	Sales Engineer Account Executive	Local and Long Distance Service PBX Support Vendor
Nortel Communications	Telephony Applications Engineer	MCS5100 Communications Server
Arch Paging	Executive Account Manager	External Pagers
Nextel Communications	District Sales Manager, Corporate and Government Accounts	Nextel Wireless Solutions

3 Current Telecommunications Environment

This section includes purpose of this section is to provide sufficient technical and system information to provide an understanding of the technology currently in use. The overview indicates the functionality and assesses how well it supports the business requirements of the hospital. The following table includes a short-hand view which is supported by a more detailed review of each specific area of concern expressed by staff and the impact it has upon their ability to deliver exceptional care.
(See table on pages 7 - 8)

Communication Platform	Basic Function	Benefit	Status
Phone System - Nortel Meridian 1, Model 61C. Software Release 1811/21/54	Provides telephone service.	Nortel is recognized as a leader in the telecommunications environment providing structured migration paths and overall investment protection.	System is capable of being expanded to meet current and future telecommunication needs while enhancing communications through advanced features and technology offerings.
Voice Mail - Nortel Meridian Mail, Software Release 11.17	Allows a caller to leave a message for a staff member.	Integrated into the "new" 61C cabinet, as a module within the telephone system.	Meets existing voicemail requirements. Can be upgraded to provide additional communication collaboration tools.
SpectraLink Telephones/Westcom Nurse Call System (**Please note**: it was reported that a total of five (5) different Nurse Call Systems are currently in use)	Westcom is the Nurse Call system utilized by Med/Surgery provides mobility to staff in specific nursing areas.	SpectraLink telephones utilize lines through the telephone system and operate as extensions or direct in dial lines (DID). Westcom Nurse call transmits to a monitor at the nursing desk and is then messaged to the SpectraLink phone assigned to specific care providers.	15 devices deployed on the Med/Surgery floor. Shift Lead creates a schedule, the secretary then assigns a phone based upon the schedule for each shift. The schedule is hand created and then faxed to other departments throughout the hospital. *The other Nurse Call systems were identified only as being installed by individual departments and are not integrated.*

Communication Platform	Basic Function	Benefit	Status
Internal Paging - Motorola Data Radio Paging	Provides the ability to page within the hospital facilities.	Allows staff to communicate internally via voice page.	Does not meet staff or patients needs. Does not provide seamless collaboration or enable exceptional levels of personalized service.
External Paging – Numeric digital pagers	Provides the ability to dial into an external paging source and page a staff member outside of the hospital facilities to a telephone number.	Provides for communications between staff internally and externally.	114 pagers currently deployed, rented by the hospital. Limited functionality, limited deployment.
Cellular	Provides the ability to respond and/or answer when paged or called.	Enables more immediate two way communication.	Minimally deployed.

3.1 Telephone System

The existing telephone system is a Nortel Option 61C, Software Release 21. The system is licensed for 1500 ports, with 912 ports in use and 588 spare ports. The number of ports in use is the total telephone incoming and outgoing telephone lines, DID lines, telephone stations and miscellaneous devices such as modems. The number of sets (programmed) is 801 total, analog sets 517, and 276 digital sets. It must be noted that what is shown in the software as being programmed, does not necessarily mean all devices are actively in use. The system is also configured to support Automatic Call Distribution, (ACD) with 120 agents configured, 14 in use and 106 spare.

It is important to note that the system has a total wired-for port capacity of 1500 which can be used for telephone lines/trunks or telephone sets. Of the 588 spare ports, only 56 are configured with the hardware and software necessary to make them available for immediate use. To go beyond the addition of 56 lines/trunks/sets, additional hardware has to be purchased and installed. For all practical purposes, the immediate expansion capacity of the telephone system is 56 which could potentially be consumed by the installation of sets in the soon to be completed new construction/expansion. As the system is currently configured, it has limited growth potential due to the level of software and mixture of hardware.

The specific line cards Enhance Peripheral Equipment (EPE) cards are no longer manufactured and have been replaced by a more efficient line card, the Intelligent Peripheral Equipment (IPE) card. Fortunately, a second cabinet supporting the new IPE cards was installed to support the installation of digital signaling trunks. The new cabinet is connected to the old cabinet through a proprietary link.

3.1.1 Areas Concern/Impact

(See table on page 10)

Concern	Impact
System Capacity Issues	Inability to support growth and expansion of hospital or users
Equipment Out of Production	Wired for capacity in old cabinet cannot be utilized due to hardware unavailability
Maintenance	Increased maintenance costs
Manageability	Increased cost to manage due to multiple platforms
Software	Cannot support new technology developments and enhancements; i.e., VoIP

3.2 Voicemail

Voicemail is supported by Nortel Meridian Mail with Software Release 11, and is internal to the Nortel Meridian PBX. The Meridian Mail has sufficient capacity to support the current installed base; however, as with the telephone system (PBX), the software version is an older release and may need to be upgraded along with the PBX to support future expansion and integration with the PBX.

There were no significant concerns expressed in regards to Voicemail.

3.3 Paging – Internal

Internal paging is support by a Motorola Data Radio Paging Transmitter, recently upgraded with a DX Radio PT4000 UHF 50 watt paging transmitter. This upgrade was required due to the exhaustion of capacity and inability to add additional pagers as needed. Cost of upgrading to support additional pagers was almost $10,000 dollars. The Radio Paging System allows for single action radio paging to occur through a dedicated paging access line, or when unavailable, through the operator. The person paging an individual speaks the desired message and the receiver hears a voice 'radio' page.

In addition to the upgrade of the paging transmitter the supporting vendor, Day Wireless, has recommended the upgrade of the paging terminal to allow digital format paging and group paging, at an additional expense. This in turn would force an upgrade of all radio paging devices, estimated to be approximately 100, to a new model at a very high cost per unit.

3.3.1 Areas Concern/Impact

The ability to communicate internally is largely dependent upon the ability to communicate via the Radio Pagers. Unfortunately, there are multiple areas of concern with this means of communication. The overwhelming concern expressed, by far, supports the determination that the current radio paging system is ineffective and a waste of time.

This paging system does not provide simple user features and functions such as the ability to store a message, repeat a message or set the pager to vibrate when working with a patient. If a radio pager malfunctions, it is difficult to replace due to the fact the pagers utilized are no longer being manufactured. Refurbished pagers are not readily available, if a new pager must be purchased, the cost is extraordinarily high. The most recent information provided indicates that a pager was purchased in the last few months for $350.00.

This technology no longer adequately meets the existing communication requirements and further investment in this technology does not meet the stated long term goal to:

> **Implement new services and enhance existing services to improve the health of the community or the financial performance of the hospital.**

Internal Radio paging issues

(See table on pages 13 – 14)

Concern	Impact
Lack of page clarity	Individual cannot hear and respond effectively
Inability to hear message	Inability to respond, causes wasted time due to requirement to determine who was paging and what the need was
Inability to repeat message	Lack of ability to respond appropriately
Inability to store message	Lack of ability to respond appropriately
Only voice option available	Disruptive to delivery of patient care
Pagers no longer manufactured	Cannot replace pagers as needed
Internal human resource cost of supporting old paging devices	Staff time required to “tinker” with pagers in-lieu of working on delivery of care issues; impact to medical care teams and plant operations staff
Refurbished pagers have minimal life span	Refurbished pagers are reported to function for approximately two months, wasting staff time and hospital money
Cost of new model pagers	Cost of new model pagers ranges from $350 per device to $399 per device
System interference	Potential interference with other hospital equipment
Squawking	Lace of clarity of pages, cannot understand transmitted message
Inability to receive pages outside of facility	Missed pages
Inability to respond immediately to pages	If page recipient is actively engaged in a task, the ability to immediately respond is unavailable; disruptive to staff; disruptive to patients
Some staff carry both internal and external pagers to be available through both systems	Multiple devices, increased expense

Concern	Impact
Busy signals on paging access line	Causes repeated attempts or alternately the operator is asked to complete the page
Operator's busy	Repeated attempts, forgets who was paged and why

3.4 Paging – External

External paging is supported by Arch Paging. Arch Paging provides 114 numeric pagers with the ability to display a telephone number. The numeric pagers do support tone and vibration modes, message storage, date/time stamp, and alarm settings. The cost per month for individual pager rental is $3.25, monthly expense of $370.50, annual expense of $4,446.

Paging units are available that would allow for multiple display modes, selection of indicators and alert features and messaging capabilities which include full two-way messaging capability, preprogrammed replies, address book, allows for message folders and much more, the cost increases accordingly, the more features, the higher the cost.

3.4.1 Areas of Concern/Impact

External pager issues

(See table on page 16)

Concern	Impact
Limited deployment of external pagers	Critical staff inaccessible off hosptial site
Numeric display only	Page recipient must find a phone before being able to determine the nature of the page
Cannot send text message to advise recipient urgency or content	Pager allows for numeric page only
Cannot determine if page has been received	Limited communication capability, cannot immediately respond
Multiple pages received	Inability for immediate response drives multiple pages

3.5 Wireless

During the discovery process in discussions with Purchasing Director, it was learned there is minimal deployment of wireless/cellular devices to hospital staff. Total number is estimated to be around six (6). Utilization of this technology, at the business level, is very limited. Service contract is reported to be with AT&T.

3.5.1 Areas of Concern/Impact

(See table on page 18)

Concern	Impact
Ineffective use of technology	Critical staff inaccessible off hospital site
Unknown which staff carry the hospital provided phones	Precious time is wasted trying to locate the appropriate staff

4 Technology Options

This options and will support:

- exceptional levels of personalized service
- the elimination of duplication of tasks and devices
- a reduced requirement for large capital investments

(See table on pages 20 – 21)

Communication Platform	Option 1	Estimated Cost	Option 2	Estimated Cost	Option 3	Estimated Cost
Telephone System	Migrate old hardware to new columns and run on the existing software release	$84,000[2]	Migrate old hardware to new columns and upgrade Option 61C software to Release 3.0	$625,000[3]	Seek competitive bids on multiple telephone systems	$487,500[4]
Voice Mail	Upgrade existing system software	$2,325	Upgrade Meridian Mail to Call Pilot	$20,137	Seek competitive bids from multiple service providers for replacement system	$55,000[5]
Internal Paging (does not include replacement of external pagers)	Upgrade existing radio paging system and replace pagers with tone, voice,vibe,model	$15,000 equipment upgrade $35,000 to purchase 100 new Minitor IV pagers	Replace with Motorola Talkabout T900 two-way, messaging device	$3,600 [6] per month, $43,200 annually	Replace 100 internal pagers with Nextel Communication devices	$1620 for 15,000 pooled radio minutes and .08 cellular per minute

[2] Price takes into consideration $11K discounting offered by Qwest through 6/30/04
[3] Industry estimate of $350.00 per port used for calculation based on 1500 total ports, excluding telephone instrument (existing port count)
[4] Through competitive vendor participation cost is estimated at $325.00 per port, excluding telephone instrument cost
[5] Industry estimate of $5000 per storage hour, 11 hours of storage (existing hours of storage)
[6] Cost per device estimated at $36.00 per unit, 100 internal pagers = $3,600 per month; combined cost per month to replace both internal and external pagers$7,704, $92,448 annually, less current expense of $4,446 annually

Communication Platform	Option 1	Estimated Cost	Option 2	Estimated Cost	Option 3	Estimated Cost
External Paging (does not include replacement of internal pagers)	Upgrade pager to provide additional features	$1,368 per month, $16,416 annually	Replace with Talkabout T900 full two-way messaging	$4,104 per month, $49,248 annually	Replace 114 pagers with Nextel Communication devices	$1847 for 17,100 pooled radio minutes, $.08 cellular per minute
Combined Internal and External Paging[7]	Eliminate all existing devices and replace with alpha-numeric pagers	$2,570 per month, $30,816 annually	Replace with two-way messaging devices (T900 units)	$7,704 per month, $92,500 annually	Replace with Nextel Communication devices	$3,467 for 32,100 pooled radio minutes and $.08 cellular per minute charge, $41,604 annually plus cellular utilization
Cellular/Wireless	Replace internal and external pagers with cellular phones	[8]$12,840 per month, $154,000 annually	Cancel all the hospital provided cellular phones and move to two way pagers	$7,704 per month, $92,500 annually	Replace all with Nextel Communication devices	$3,467 for 32,100 pooled radio minutes and$.08 cellular per minute

[7] Paging transmission infrastructure enhancement costs are not included.

[8] Estimated average cost per unit, per month is $60.00

4.1 Advanced Technology Options

In addition to the options identified above, three more technologically advanced options were researched and information is provided for review and consideration. These include SpectraLink wireless telephones; Sprint Communications and Nortel Networks Multimedia Communication Server. Following is a brief overview of each technology, the pros and cons and estimated costs.

4.1.1 SpectraLink

SpectraLink wireless communication telephones are currently in use by the Med/Surgery department with 15 devices supporting both voice and text messaging. SpectraLink wireless telephones are deployed "behind" the telephone system providing seamless integration and feature richness. The features and functions that are available to the desk telephone user are available to the SpectraLink user. This tight integration allows the user to move freely about the facility and between facilities eliminating delays caused by overhead and radio paging. The mobility provided allows staff to be more efficient and productive through immediate access to each other which could dramatically improve the delivery of care to patients. SpectraLink is a market leader in the healthcare industry providing integration with many nurse call systems. Some of the feature benefits are:

- Immediate text display of patient, room, and call status
- Direct call-back to patient room
- Automatic forwarding to alternate caregiver
- Automatic patient assignment by shift
- Dynamic text messaging from console
- Remote operation of corridor indicator lights

The benefits are easily recognized. One telephone number, one voice mail box, full integration with the telephone system all providing improved communication while leveraging the existing Nortel technology investment. The technology could be implemented department by department or floor by floor, does not use cellular minutes or impact the monthly operations budget. Once the core system is installed, expansion or implementation could take place at a predetermined rate or as funds become available.

The downside is the upfront financial investment. In addition to the cost of installing the Interface Module, the cost of additional base stations and DC power supplies, the cost of the telephone units is high. In order to adequately support 200 devices, an inventory would be required to backfill broken or lost devices. The cost of repair could be offset with a maintenance agreement; however, this in turn would impact the monthly operations budget to what extent is unknown at this time.

Based upon previous quotes received from Day Wireless[9], the cost of supporting 200 SpectraLink users is roughly estimated to be $284,000. A new site analysis and cost estimate could be undertaken to determine a) the initial core investment, b) implementation path, c) lease options and/or financing available.

The cost assumptions are identified in the table below:

(See table on page 24)

[9] Pricing information generated in 2002 and 2003

Description	Price	Quantity	Extended Price
Link 3000 CPU, Shelf, System Controller, Administration Kit			$56,625
External Base Stations	$1,790	4	$7,160
Internal Base Stations	$1,295	18	$23,310
DC Power Supplies			$4,000
Wireless telephone w/vibrator, charging stand, power supply, high capacity battery pack, carrying case	$965	200	$193,000
Total			**$284,095**
Depreciated over 5 years (annual depreciation)			**$56,819**

4.1.2 Sprint Communications: Instant Voice Communication for Mobil In-Building Workers

Sprint provides instant two-way voice communications using wireless LAN technology using 802.11b Wi-Fi technology. The primary single advantage of Sprint over SpectraLink is that it provides virtually hands-free operation through voice activation. Incoming calls can be voice answered, while outgoing calls are initiated through the touch of a button. The Sprint system is deployed behind the telephone system but does not use the telephone system as the internal routing mechanism. The Sprint Communications Server and Sprint Telephony Solution Software are managed via the LAN using IEEE 802.11b wireless access points. Through the application software databases can be constructed to support identification of users by name, job function, group or location within the facility. Features such as conference calling, group messaging, call blocking, call screening and do-not-disturb are supported. Outgoing calls are placed through the telephone system.

The benefit can be seen as improved communication, ease of use, efficient use of resources and one-to-one or one-to-many communications capabilities.

The downsides may be many. The cost of deployment and implementation is first and foremost with the typical ratio of WLAN users to access points is 10:1. Overlapping access point cells of coverage are created to provide a single coverage area for roving staff. The second primary concern is the IT resource requirement that will be needed to keep the system populated with current information. A complete review of the network would be required to identify issues such as security, bandwidth, and quality of service. This resource requirement would extend after implementation to database management, population and information propagation.

Costs are not included at this time due to unfamiliarity with the existing LAN infrastructure and the inability to adequately project what may be required to support the installation. Pricing can be obtained through conducting a site survey and cost analysis at a later date if additional information is desired.

4.1.3 Nortel Network Communication Server (MCS) 5100

The MCS 5100 (MCS) is a network-based, application delivery solution that delivers voice, data, and video services. MCS allows staff to communication and collaborate using a desktop PC, laptop computer, wireless device or plain old telephone. Find me/follow me capabilities promise advanced services and resource efficiencies. Staff can determine if coworkers are online, on a call, available or unavailable to answer a call or attend a meeting, virtual or physical. Using IEEE 802.11b Wi-Fi technology, mobility extends beyond the facility through user defined parameters.

The system consists of an IP Services Gateway, integrated security services, secure routing technology, including dynamic routing over secure tunnels; full quality of service (QoS) and adaptive bandwidth management; and seamless handling of voice and data.

Further research would need to be undertaken to determine the benefits and impact to the hospital. However, the initial estimate for a 100 user starter kit is $71,500 and could only be undertaken after the telephone system was upgraded to Release 3.0 software which is over $50,000 alone.

With this said, it is apparent there are many options available to the hospital and a great deal of information to sort through. Our recommendations focus on moving the hospital forward at a reasonable pace while being fiscally responsible. Keeping the stated objectives in mind:

1. Identify the means to provide consistent clear communications between physicians, staff, patients and suppliers.
2. Outline a plan to move from current technology base to enhanced technology base.
3. Minimize costs through the utilization of existing technologies and equipment where applicable.
4. Provide financial estimations for strategic planning purposes.

We offer the following recommendations.

5 Technology Recommendations

Technology Recommendation – Phase I
(See table on pages 27 – 28)

Communication Platform	Recommended Action	Benefit	Migration	Cost
Telephone System	Upgrade EPE to IPE equipment and remove old modules. Evaluate station equipment to ensure it meets the needs of the user. Provide telephone system user training. Review incoming communication flow. Deploy direct in dial (DID) lines reducing patient call hold time.	Ability to expand as needed to support facility construction, service expansions, etc.	Hardware migration can be completed in stages. Majority of the equipment supported by old hardware is patient room phones which could be worked over a few days.	$84,000[10]
Total Estimated Capital Investment				**$84,000**
Total Estimated Operations Expenditure				**0**

[10] Price takes into consideration $11K discounting offered by Qwest through 6/30/04

Communication Platform	Recommended Action	Benefit	Migration	Estimated Cost
Paging	Replace internal and external pagers with Nextel Communication devices.	One-to-one, one-to-many communications, multiple service plan options, digital and text paging, direct talk (walkie-talkie) communication, cellular service available to staff that require it, consolidated billing, data communication integration	Sign agreement, order equipment, complete building enhancement in Radiology, Day Surgery and Basement, deploy by department in training sessions. After implementation complete, deploy data radio pagers for business continuity use. Return external pagers to Arch Paging.	$50.00 upfront shipping cost; 3 year agreement, build out paid for by Nextel (estimated at $25,000), average cost for 214 devices - per user, per month $16.20, $3,467 per month, $41,602 annually for 32,100 radio minutes,.08 additional cellular per minute charge(units can disallow cellular service access)
Total Estimated Capital Investment				**0**
Total Estimated Operations Expenditure Annually				**$37,602[11] Cost of 3 year term $112,806**

[11] Takes into consideration current monthly pager expense

These recommendations, if implemented, are anticipated to meet our clients voice communication requirements for the next 24 months or longer. Additional enhancements can be undertaken as the need arises, or business demands it. Phase II addresses enhancements that would enable our client to embrace wireless communications, multi-media communications, web conferencing, virtual conferencing and collaboration on a converged IT network. Some of the benefits that could be realized may not be drivers for our client and therefore, not worthy of undertaking. We have outlined the path to moving away from vendor supplied and supported to technology to in-house supplied and supported technology. Of course, vendor maintenance on all equipment will be required unless the requisite technical expertise is brought on staff.

Technology Recommendation – Phase II

(See table on page 30)

Communication Platform	Recommended Action	Benefit	Migration	Estimated Cost
Telephone System	Upgrade system to Release 3.0 software and Meridian Mail to Call Pilot	IP telephony with IP gateways for LAN or WAN connectivity, converged voice and data networks, remote facility telephone support through IP, multimedia applications (conferencing, whiteboard collaboration, file exchange, web push and co-browsing) personalized call management and instant messaging.	Software upgrade from Release 21 to Release 3.0, (includes IP telephony starter kit)	$42,738 if purchased before 6/30/04; $73,622 after 6/30/04. Note: financial incentives are offered when upgrading hardware and software by 6/30/04. Price does not include batteries which are estimated at $10,000
Nextel	Replace with SpectraLink or MCS 5100 devices	Capital depreciation, leveraging telephony investment, further enhancing staff communication and collaboration, expanding wireless capabilities,	Perform a network and security assessment, build out network, order equipment, establish databases, educate staff, deploy.	$150,000 - $200,000

6 General Recommendations

Through discovery, observation and discussions with staff, several issues came to light that are important to note as you move forward in assessing the overall communication structure. They are presented for your review and consideration.

Centralize the procurement, management and support of telecommunication services, voice, data and nurse call. Upon undertaking the gathering of data to perform this assessment, it became evident that there is no single "holder of the keys". Departments can secure funding without consideration of the overall impact to services. Though the technology being sought may enhance the delivery of services to one department, it may have a negative impact on supporting departments such as telecommunications, Bio-Med and others.

IT Steering Committee should envelope all communication systems. The IT Steering Committee should be responsible for the development of standards and in overseeing the adherence to the standards that are established. Through standards benefits can be recognized in both hard and soft costs. Some such hard costs are in maintaining the systems, available inventory, and purchasing agreements. Soft costs could include training, internal support and troubleshooting, improved productivity, and improved communication flow.

A thorough evaluation of installed telephone devices should be undertaken and system education required. The Nortel telephone system provides significant feature richness that is not being fully exploited. Many of the frustrations encountered by staff may be due in part to telephone device they are using and lack of operational understanding. Of those that were interviewed several did not know, or were unaware, of how to establish a conference call; had to go to another office to access a speaker phone; did not know how to transfer a call, place it on hold and retrieve it; and were unaware that multiple calls could be handled simultaneously.