

# Broadband Internet Connectivity Plan for La Paz County

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## Introduction:

The following proposal is presented as a solution to the current network limitations and restrictive broadband data-link connection rates for both the Main and Judicial Campuses. This includes the Public Defender, Sheriff's Office and Public Fiduciary. Our goal has been to create an effective solution that will allow all departments and offices, located both on the main network (such as the Main and Judicial campuses) and off the main network (such as the County Shop, County Park and Bio-Terrorism Departments) to have a useful and efficient connection to county resources. We have also been able to maintain the current radio-link that connects the campuses and find a way to make it a valuable component of our network.

With the increased reliance on the internet to handle the VPN connections to various state agencies a true broadband connection is essential. My department has worked very hard to present a solution that is feasible and practical but not a spending free for all. We have identified grant money<sup>1</sup>. Obtained agreements from individual departments to contribute their resources<sup>2</sup> where possible, and made use of existing, but underutilized, network hardware.

Also included in this proposal are solutions to the current network performance and some security issues are addressed. Those "little problems" that seem to constantly pop up will be resolved with the migration to Server 2003 and a refreshed Active Directory. Our goal is to segregate server functions. Aside from the SnapServer and Mailbox there are no dedicated servers performing specific task. The most noticeable examples are the B1-DC-01 and B1-DC-03 servers. These servers are configured to handle practically all network, domain, and Active Directory functions. This could be acceptable, but these servers are also the primary storage devices and application servers. It is imperative that storage of sensitive, critical and irreplaceable data NOT be on the same servers as those used as system servers. These issues will be resolved by:

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<sup>1</sup> The County Attorney's Office is providing access to grants they have obtained. They are to present request to the Board for approval for the Cisco PIX 515E Firewall.

<sup>2</sup> The School Superintendents Department has agreed to provide resources for the Multi-Mode Fiber run between Building 2 and the IT Building.

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- Migration to Server 2003 and the subsequent creation of a new Active Directory. By proper configuration and management of the Active Directory, the network overhead used for replication of Directory Services will be cut dramatically.
- Centralization of the system servers will reduce network traffic by allowing network request to be directed to a central location therefore eliminating traffic caused by client machines broadcasting to locate services and resources.
- Placing individual department file servers in the departments that use them and creating individual network segments, thus eliminating the network traffic created by routine user task from having to leave their immediate physical network segment. Assuring the department's own file servers are used exclusively for the needs of their respective users, giving them better network performance.
- The proper placement, configuration and use of Domain Controllers.
- Implementation of a dedicated server to perform the role of Forest Root Domain Controller. Free from other tasks such as Routing, Storage, and running applications such as Visions.
- With the addition of Microsoft Exchange for email and Microsoft Office integration and 5 user licenses for Terminal Services<sup>3</sup>, users will be able to access the files and resources they use from outside the network when the need arises. It will be possible to share elements of Microsoft Office 2003 to take full advantage of the powerful suite of applications that we already possess.
- Create County internet and intranet websites that will integrate with Microsoft Exchange and Microsoft Office. Users will be able to maintain their calendars, organize and participate in group projects, and creation of inter/intranet VPN links.
- Put the most sensitive financial and personnel data on a machine that is separated from the main network on its own network segment. The router will be configured with very tight security and access controls.
- Implement a solid and effective back-up strategy performed from a centralized location.

### Summary:

The goal of this plan is to bring all the county offices, including all remote locations, together on an efficient and secure network. By taking small steps while focusing on the highest priorities and maximizing the technical resources that we will have available, the County and its users will have a convenient, efficient, and productive network. Following is my proposal to seek approval for procurement of the equipment needed to take the first step. The objective of this first step is to get the Judicial Campus a true broad-band connection, create a useful link between both

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<sup>3</sup> An additional four licenses will be needed for the School Superintendent's office which they will include in a separate proposal.

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campuses and free up the existing radio-link. On the Main Campus the objective will be to get the most frequently accessed and most critical data onto a secure and productive server capable of servicing those requests. The existing equipment will be utilized in other areas.

### Proposal:

- Establish broadband cable internet service to the Main and Judicial Campuses.
  - I have taken all the preliminary steps needed with CableVision and they are ready to proceed upon approval.
  - Both campuses are wired and ready to accept the cable connection.
  - The monthly cost of DSL access is \$590.39. CableVision has indicated an amount of \$299.00 per month for each campus. They have claimed to provide
    - more bandwidth (2Mps both upstream and downstream)
    - more public IP addresses (16 per connection = 32)
    - more reliable connection
  - We are currently on a month-to-month service agreement with Red River Communications for our current DSL internet connection and no penalty will be involved with canceling their service.
  - Currently we are connected with Red River Communications at a bandwidth rate of 784Kbs. Following is a list of bandwidth rates and their cost per month for each connection (we would need 2 connections).

▪ 784Kbs	\$579.44
▪ 1.04Mbs	768.64
▪ 1.568Mbs	1148.00
- Procurement of the following:
  - 1 HP ProLiant DL380 G3 Server. [ITEM A](#)
    - It is reasonable to presume this machine will be adequate to fulfill the needs of the county for a minimum of 5 years.
    - This machine will be the main County file server. It will provide access to most user documents. This machine will be capable of handling an extremely high amount of request. When a user opens a document the capabilities of this server will determine the efficiency of that request. The investment here will be returned in quicker access, greater reliability, and stronger security.
    - The introduction of this server will free up both of the current main servers.
    - One of these current servers will be employed as the main root server for the domain. It will be responsible for access control, user authentication, replication of Directory services, Remote access, Terminal Services, Routing, DNS, DHCP, etc. These are system functions and this server will be dedicated to those tasks to maintain the network infrastructure and the Active Directory.
    - One of these current servers will be employed as the main application server. It will be responsible for providing access to applications such as Visions, SQL Server, and other server based applications. It will not be bothered by request to perform other, and higher priority, request such as authentication which takes directly away from the performance abilities of an application
  - 1 Cisco PIX 515E Firewall with 3 Ethernet Interfaces and DMZ Module [ITEM B](#)
  - 3 NETGEAR Cable Routers [ITEM C](#)
  - 1 Cisco Catalyst 3550 24 10/100 Switch. [ITEM D](#)
    - This switch will do the routing between the departments at the Main Campus and handle the traffic allowed over the radio link.
  - 1 year Cisco SMARTnet Support Service. [ITEM E](#)
  - 2 Cisco 1000BASE-SX GBIC MM fiber modules [ITEM F](#)

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- Multi-Mode Fiber ran and terminated from the Public Works equipment room to the server room in the IT building. [ITEM G](#)
  - Provide high data transfer rates to a centralized location.
  - Centralization of system appliances, administrative tools, and technical resources is considered necessary to maintain an efficient and stable network environment.
  - Makes feasible the task of performing routine procedures such as running daily backups and monitoring of network load conditions.
- 4 CALs (client access license) for use of Terminal Server capabilities. [ITEM H](#)
- 1 Microsoft Exchange Server 2003 [ITEM I](#)
- 150 Exchange Client 2003 Per Device Licenses (CAL) [ITEM J](#)
- 1 Microsoft Exchange Server 2003 Media [ITEM K](#)
- Upgrade TrackIt to Professional version for web-based work order capability [ITEM L](#)
- Dell OptiPlex GX280 STD for Financial Department [ITEM M](#)
- Dell OptiPlex GX280 STD for IT Department [ITEM N](#)
  
- Setup child domains and network subnets for the following departments: *This will be tied to the creation of a new domain and subsequent migration to Windows Server 2003.*
  - Public Defender
  - County Attorney
  - Recorder
  - Treasurer
  - Community Development
  - Career Center (when joined to the main network)
  - Health
    - Bio-Terrorism
    - Tobacco Prevention
  - Information Technologies
  - Board of Supervisors
  - Public Access
  - County Assessor <sup>4</sup>
  - Sheriff's Office <sup>5</sup>
  
- Replace the existing and vulnerable domain namespace from lapazco.com to lapazco.lpc.
  - The top level domain name 'com' is used in the public domain. As such it is potentially reachable by users and hackers in the public domain. Using a unique top level name such as "lpc" is a significant step for network security.
  
- Subnet the existing network (192.168.0.0) to allow at a minimum the Public Defender and County Attorney offices to be disjoined.
  - The ultimate goal is to subnet the network along departmental lines. At the same time partitioning the domain namespace along the same lines. Both of these steps will greatly reduce unnecessary network traffic from taking place and slowing the network down.
  
- Create secure connections between the campuses and remote offices for users to perform administrative tasks.
  - We will use Terminal Services on a VPN for departments located off the Main Campus when using server based programs such as Visions and applications such as Access. Currently, to run Visions, a remote user is required to first download the application front-end, perform their tasks, and then upload it back to the server. Because of the sizes of

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<sup>4</sup> The network topology will include the Assessor's Office so if in the future that office returns to the main county network they will only have to plug their computers into the existing Ethernet ports located inside that office.

<sup>5</sup> The Sheriff's Office is currently creating an independent network to comply with certain guidelines. The network topology will include the ability for them to connect to the main network in case of emergency.

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these files this approach effectively prohibits its use by remote users. By using Terminal Services a user creates a connection to the server and runs their programs and applications from that server. As if they were sitting right at the server. Eliminating the need to transfer large files over public internet lines and slow wireless links.

- Re-Create the existing VPN connections with the state agencies.
- Create a DMZ to place an existing server to function as the web, email, intranet and remote access server.
  - This server will be outside the main logical network and more importantly, outside the Firewall.
  - Ability to host and bring online the websites for La Paz County, La Paz County Park, Bouse Community Park, Centennial Park, Emerald Canyon Golf Course, etc.
  - Eliminate the current cost of hosting the County website at an off-site location.
  - By maintaining our own web-server we will have total control over what kind of technologies are used on the website to enhance the usefulness and presentation of the site.

### Benefits:

- Faster internet speeds for the Main & Judicial Campuses.
- Faster data transfer connection between the Main and Judicial Campuses.
- An Active Directory (AD) that is configured properly.
- A more reliable and efficient network.
- Segregation of physical network topologies.
- Limit local departmental network traffic to each department.
- Creation of logical network segments.
- Centralization of Network Management servers, services, maintenance, monitoring, backup, and administration.
- Individual departments can keep their application/file servers in their offices if they prefer.
- Provide secure and reliable access for all County departments and users to existing County resources.
- La Paz County Intranet Site to tie together all resources and provide a mechanism for different offices to work together and communicate effectively with each other.
- Provide remote access for remote offices and users.

**Conclusion:**

This plan is an extensive endeavor and should be considered a major upgrade. The improvements involved will bring the network infrastructure up to a level that will be adequate for at least five years and perhaps beyond. Though not approaching the “cutting edge” level, the technologies we are proposing will bring us up to date with the standard technology that is currently available for LANs without wireless or VoIP (Voice Over IP [Internet Protocol] used for connection and transmission of phone calls) capabilities, and is also reasonable.

*Obsolescence* is an unavoidable side effect of advancing technology. Our client workstations are Windows XP, a 32-bit operating system, and are not compatible with 16-bit clients and devices. So just as rotary-dial telephones and the typewriter (except for one) became obsolete, our network can no longer support outdated devices. This county network can be brought up to the current technology and made to be accessible to remote locations at a cost that is very reasonable. Departments such as the Public Defender, School Superintendent, Parks, in fact all remote offices will have the ability to run applications, such as Visions, from their remote locations with the application actually running on the server and not the client machine. They will no longer need to transfer the data to their workstations from a server over the internet. Without Terminal Services available, a remote user must transfer very large files to their machine over the internet, effectively prohibiting them from using these types of programs.

The proposed County Intranet will provide a place to bring all of the members and staff of the county together. Every form, application, policy, procedure, etc. will be available. Not just forms and applications that can be printed then filled out, but forms that data can be directly entered into then either saved, printed, or even directly emailed from the same intranet page. It will give departments the opportunity to maintain shared calendars for individuals, directors, or the entire office. The possibilities are endless and should be explored.

Thank you for considering this proposal.

Respectfully,

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Larry Carlisle

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Date

## LA PAZ COUNTY NETWORK UPGRADE AND REORGANIZATION PROPOSAL

### Cost Sheet:

Following is summary of the devices, appliances, and hardware needed and their approximate cost.

Item	Qty	Cost
HP ProLiant DL380 G3 Server	1	6016.03
Cisco PIX 515E Firewall	1	2536.86
NetGear RP614 4-port Cable Router	3	159.00
Cisco Catalyst 3550 10/100 port Switch	1	2100.00
Cisco SMARTnet 1 year service agreement	1	250.00
Cisco 1000BASE-SX GBIC MM module	2	740.00
Multimode Fiber Backbone connection	1	2694.34
Windows Terminal Server 2003 CAL (Client Access License)	4	205.92
Windows Exchange Server 2003	1	452.33
Windows Exchange 2003 CAL	150	6477.00
Exchange Server 2003 media only	1	15.00
Intuit TrackIt Pro upgrade	1	410.11
Intuit TrackIt Audit Plus Upgrade	1	79.00
Dell OptiPlex GX280	1	669.00
Dell OptiPlex GX280	1	1893.05

### Timeline:

Following is a timeline summary of the Milestones in this upgrade plan. This timeline assumes that approval is given. For details please review the attached timeline.

#### La Paz County Network Upgrade Timeline

<b>Upgrade Proposal</b>	Submit 1/26/05
Order approved appliances and devices	2/1/05 To 2/3/05
Prepare Network Documentation	2/1/05 To 2/14/05
Setup TrackIt on IT Admin Console	2/2/05 To 2/11/05
<b>Get Cable connected at Judicial Campus</b>	2/9/05 To 2/24/05
Run MM Fiber to IT building	2/28/05 To 3/4/05
Setup input and feedback mechanism for Intranet	2/21/05 To 2/25/05
Prepare network for new Domain	2/28/05 To 3/28/05
<b>Get Cable connected to Main Campus</b>	3/1/05 To 3/28/05
Setup Public Internet Sites	4/11/05 To 4/25/05
<b>Begin County Intranet</b>	4/1/05

## Glossary:

**Active Directory** The directory service that stores information about objects on a network and makes this information available to users and network administrators. Active Directory gives network users access to permitted resources anywhere on the network using a single logon process. It provides network administrators with an intuitive, hierarchical view of the network and a single point of administration for all network objects.

### Main Campus

Made up of offices located in Building 1 (Board of Supervisors, Clerk of the Board, County Administrator, and Finance), Building 2 (Public Works, Recorder, Community Development, Treasurer, Assessor, School Superintendent, and Health), and the Information Technologies Department.

### Application Server

An application server is a server computer in a computer network dedicated for running certain software applications

### B1-DC-01 and B1-DC-03 servers

Two servers that are presently located in Building 1. They are considered the main County servers.

### Broadband

High-speed internet connection or data transmission rate with a speed greater than 1.5 Mbps.

### Child Domain

Also called a sub domain. A domain that is part of a larger domain name in a DNS hierarchy. Such as recorder.lapazco.com. The portion "recorder" in this example is a child domain of the lapazco domain.

### DHCP

Short for Dynamic Host Configuration Protocol, a protocol for assigning dynamic IP addresses to devices on a network.

### DMZ

Short for demilitarized zone, a computer or small sub-network that sits between a trusted internal network, such as a corporate private LAN, and an un-trusted external network, such as the public Internet.

### DNS

Short for **Domain Name System** (or Service or Server), an Internet service that translates domain names into IP addresses.

### Domain Controller

In Windows 2000 and Windows 2003 networking, the domain controller (DC) is the server that responds to security authentication requests (logging in, checking permissions, etc.) within the Windows Server domain. It is the server that essentially makes networking (at least in a secure function) possible.

### Ethernet

The most widely used local area network (LAN) access method between connected devices.

### File Server

A computer that controls a central repository of data that can be downloaded or manipulated in some manner by a client.

### Firewall

Hardware or software that prevents unauthorized users from gaining access to our computer network or that monitors transfers of information to and from our network.

### Front-End

The part of an application or program that the user sees. This is the portion of an application that is run on the client (local) machine. The Back-End is the server side of the application.

### GBIC MM

(GigaBit Interface Converter) A hardware module used to attach network devices to fiber-based transmission systems such as Fiber Channel and Gigabit Ethernet.

### Intranet

1) A computer network connecting an affiliated set of clients using standard internet protocols, esp. TCP/IP and HTTP. 2) An IP-based network of nodes behind a firewall, or behind several firewalls connected by secure, possibly virtual, networks.

### Judicial Campus

Made up of the Justice Court, Adult Probation, Superior Clerk, County Attorney, and Sheriff's Office.

Associated with the Judicial Campus is also the Public Defender and Public Judiciary Offices.

### LAN Local Area Network.

**Mailbox** Our internet email server.

### Main Network

The network that comprises the Main and Judicial Campuses.

### Microsoft Exchange

Messaging and groupware software for Windows from Microsoft. Exchange Server is an Internet-compliant messaging system that runs under Windows 2000/2003 and can be accessed by Web browsers, the Windows Inbox, Exchange client or Outlook. Exchange Server is also a storage system that can hold anything that needs to be shared.

### Microsoft Office 2003

Microsoft Office 2003 provides extensive support for XML and data collaboration. Office files can be saved as native XML for easier integration with other applications, and Microsoft's SharePoint portal turns Office into a groupware system that is administered on a Web server. Designed to be a front end to Microsoft's .NET initiative, Office 2003 applications run under XP and 2000 only. Microsoft Office is the leading application suite on the market.

### Multi-Mode Fiber

An optical fiber with a larger core than singlemode fiber. It is the most commonly used fiber for short distances such as LANs.

### Network Segment

A section of a local area network that is used by a particular workgroup or department and separated from the rest of the LAN by a bridge, router or switch. Networks are divided into multiple segments for security and to improve traffic flow by filtering out packets that are not destined for the segment.

### Radio-Link

Our existing 11MB wireless link connecting the Main Campus and the Judicial Campus.

### Forest Root Domain Controller

Same as Domain Controller (DC) however, this is the first DC in the domain and creates the Active Directory (AD). Though servers in the AD are peers this is considered the most important server relating to network performance.

### Router

A device in a network that handles message transfer between computers.

### SnapServer

The file server used by Recorder, Community Development, Assessor, and Public Works. Holds files mostly pertaining to County land.

### SQL Server

A relational database from Microsoft.

### Switch

A network switch is a computer networking device that connects network segments.

### Terminal Server/Services

An option in Windows 2000 and 2003 that enables an application to be run simultaneously by multiple users at different Windows PCs. Windows Terminal Server turns an 2000/2003 server into a centralized, timeshared computer like the good old days of mainframes and dumb terminals. The difference is that Windows provides a graphical interface, whereas mainframes provided only character-based interfaces. All the data processing (business logic) is performed in the server, and the client PCs display only the user interface and screen changes.

### Visions

The County's main finance application.

### VPN

(Virtual Private Network) A private network that is configured within a public network (a carrier's network or the Internet) in order to take advantage of the economies of scale and management facilities of large networks. VPNs are widely used by enterprises to create wide area networks (WANs) that span large geographic areas, to provide site-to-site connections to branch offices and to allow mobile users to dial up their company LANs.

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