SYSTEM ASSESMENT OF EXISTING COMPUTER SYSTEM IN THE JUDICIARY

May 2nd, 2007

EXECUTIVE SUMMARY

This document outlines the findings of a systems assessment of existing computer systems in the judiciary.

For about 3 years, the Supreme Court of Nepal has embarked on an ambitious project to automate the judiciary, with the mission to improve efficiency in the judiciary, make the judicial process more transparent, and increase access to the judicial process for various stakeholders. As part of the project, an ICT Master Plan has been developed, various infrastructure sub-projects have been completed, users have been trained, and a basic information system has been developed that is being currently used to register and monitor the progress of cases. There is a high level of commitment from the high ranking officials at SC, and the vision is being consistently communicated.

Based on the analysis of the ICT Master Plan, SC staff interviews, interaction programs and other meetings several gaps were identified, and recommendations have been made to address those gaps, and to carry out the vision as laid out in the ICT Master Plan.

The first section of the document gives the current situational analysis and highlights the accomplishments. The second section analyzes the gaps and the third section gives recommendations. All of these sections have been further categorized into topics related to the various components of ICT systems. The components are: Policy, Hardware and Infrastructure, Information Systems, End User Skill Development, and Operations and Management.

Finally the work plan and timeline for carrying out the recommendation is listed in the last section.

The Following list summarizes the gaps:

1. Lack of documented operations policy
2. Lack of processes for usage, development and deployment of ICT implementation
3. Lack of adequate hardware and peripherals, including proper data backup facilities

4. Lack of scalable and sustainable enterprise wide common information system
5. Inadequate resources for the operations and management of the systems and infrastructure

The following list summarizes the recommendations:

1. Formation of ICT Steering Committee that will oversee all aspects of ICT implementation including formation of policies and processes related to ICT.
2. Setup of Data Center and Disaster Recovery Center to provide the necessary hardware infrastructure for deployment of the systems.
3. Promote usage of Office Applications like email for internal communications
4. Formation of appropriate teams for operations and new development
5. Deployment of current LIC to 16 Appellate Courts.
6. Development of new ERP systems
7. Provide trainings on System Operation, Troubleshooting and Network Basics Trainings, including providing "train-the-trainer" trainings to designated staff

The recommendations, gaps, costing and specifications provided for this report are true for the time of the report writing. It should be noted that there might be changes and actual technologies might have been upgraded or evolved by the time the implementation is carried out.

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LIST OF ABBREVIATIONS

DBMS	Data Base Management System
DNS	Domain Name Service
Email	Electronic Mail
ERP	Enterprise Resource Planning
FAQ	Frequently Asked Questions
ICT	Information and Communication Technology
LAN	Local Area Network
SAN	Storage Area Network
SC	Supreme Court
SOAP	Simple Object Access Protocol
TCP	Transmission Control Protocol
UDDI	Universal Description, Discovery and Integration
URL	Universal Resource Locator
WAN	Wide Area Network
WWW	World Wide Web
XML	Extensible Markup Language

DEFINITIONS

ERP

ERP systems provide an integrated suite of information technology applications that support the operations of an enterprise and are not, as the acronym ERP implies, limited to planning functions. The activities supported by ERP systems include all core functions of an enterprise, including financial management, human resources management, and operations.

SAN

Storage Area Networks is a network specifically dedicated to the task of transporting data for storage and retrieval. SANs are traditionally connected over Fibre Channel networks.

SOAP

SOAP is a simple XML-based protocol to let applications exchange information over HTTP.

UDDI

Universal Description, Discovery and Integration is used for publishing and discovery of web services. UDDI provides a searchable registry of XML Web Services and their associated URLs.

1. INTRODUCTION

1.1 BACKGROUND

For about 3 years, the Supreme Court of Nepal has embarked on an ambitious project to automate the judiciary, with the mission to improve efficiency in the judiciary, make the judicial process more transparent, and increase access to the judicial process for various stakeholders.

The benefits of Information and Communication Technology Services (ICT) is evident, however an effort of this magnitude is complex and resource intensive, and given Nepal's relatives inexperience in the implementation of modern ICT services rate of failure can be high. Additionally, there are no government defined frameworks or reference models that different government entities can use to base their IT vision and leverage opportunities for collaboration and coordination.

Even in a country like India, with a sizable experience in the ICT sector, the automation of the judiciary has been handled by the National Informatics Centre, Department of Information Technology, Ministry of Communications and Information Technology. For an entity like Supreme Court of Nepal (SCN), this kind of project is full of challenges and the variables that have to be accounted are numerous. Thus there has to be a multi layered support structure of various expertises that can drive the project forward.

In this Regard, USAID/ARD Rule of Law Project has assigned Magnus Consulting Group to do a System Assessment of Existing Computer in the Judiciary.

This document contains the findings and recommendations from the system assessment.

1.2 OBJECTIVE

The primary objective of this assignment is to do a system assessment of the computer system in the judiciary, and give recommendations for implementation/changes of ICT master plan, and help formulate a strategy for implementation. The following are the activities detailed in the TOR:

1. To study the presently available hardware and software in the Supreme Court.
2. To review the existing ICT Master Plan for Computerization of the Supreme Court prepared by its staff and suggest changes in needed.
3. Evaluate the training modules of the Supreme Court and level of expertise of its staffs and recommend desired trainings and skills for those receiving future training.
4. To assess the available hardware, software and staff skill levels currently at the Supreme Court.
5. Recommend the hardware, software, applications and skill requirements that will be required in addition to the existing hardware software and skills identified in No 1, 2, 3 and 4 above that will be needed for implementation of the Supreme Court's Master Plan. The recommendations must include technical specifications of the hardware, software and applications required for implementation of the Supreme Court's Master Plan.
6. Develop a work plan and time line for purchase, installation and debugging of the equipment, software and applications and a training program for staff.
7. Regular reporting on progress on the Assessment.
8. Within 50 days from the date the consulting contract is signed bidder must submit draft report covering each of the above items as well as any other items agreed on during the assessment; and a final report within 60 days.

1.3 DELIVERABLES

The following are the deliverables of this assignment.

1. Weekly meetings with Supreme Court and ARD
2. Written progress report 25 days after signing the contract
3. A draft report in a format acceptable to the Supreme Court and ARD
4. A final report in a format acceptable to the Supreme Court and ARD.

1.4 ASSUMPTIONS, CONSTRAINTS AND DISCLAIMERS

This report has been developed based on the ICT-NJ Mater plan, interaction with various SC staff and officials, selected stakeholders, site visits, ocular inspections, documents analysis and various discussion meetings.

The process for preparing this document has tried to deal simultaneously with the realities of the SC's organizational culture, the ground realities of overall ICT infrastructure in Nepal, and the readiness of other governmental agencies with regards to computerization.

Thus the following constraints have been taken into account:

- **Rapidly evolving technology constraint.** The exponential rate at which technology changes means that the recommendations and master plan has to be constantly re-evaluated.
- **Manpower Constraint**. The lack of expert manpower in development or deployment of systems and unavailability of internal IT staff coupled with their long training cycles means that the priorities have to be established. Thus consideration has been given to contracting expertise versus building in house capacity.
- **Integrated Systems Constraint**. SC's role represents all of the judiciary, thus the system must be integrated with all of its offices (courts) and also have ample mechanisms to share different levels of data internally and externally to other entities like Office of the Attorney General and BAR association. A long-term view is critical in order to appropriately select software technologies.

- **Existing Infrastructure Constraint.** There have already been significant investments within the SC for developing infrastructure. Thus the system must adapt to current limitations and have provision for future extensions.

The following assumptions have been made in this report:

ICT Master Plan

This report is highly dependent on the existing ICT Master Plan, and is meant to be a compliment to it. Therefore it primarily addresses issues that are missing in the ICT Master Plan and or modifications.

Work Plan

The order of implementation will vary in multitude of factors including volume of business, availability of technical resources, and financial resources. Thus SC must consistently evaluate the work plan to see which activities can be implemented to get the best return.

Common Approaches

The government of Nepal must function as an integral organization. Common approach within the government will reduce the overall cost of implementation and can provide complementary systems. For e.g. The United States Office of Management and Budget (OMB) is developing the Federal Enterprise Architecture in response to the E-Government initiative.

Funding

Given the cost of modern technology, the cost of implementing any service is significantly higher initially and return on investment can only be realized through efficient use. It is assumed that SC will solicit funds through the government and other development agencies thus; no recommendations on the sources of funding have been made.

2. SITUATIONAL ANALYSIS

2.1 ICT MASTERPLAN

SC has already developed a comprehensive ICT Master plan that outlines the vision and goals for the computerization of the judiciary. The main goal of the plan is 'Complete Electronization' of all processes in SC and all its constituent organizations by 2010. The master plan has tried to deal with the realities of such a task and thus prioritized implementation and development of the necessary systems. The Master Plan also has a comprehensive implementation strategy and has detailed the timeline and costs associated with the implementation. In this regard a lot has been accomplished in terms of the infrastructure development at SC and the implementations to the appellate courts are underway, and are expected to be completed in 2007.

2.2 POLICY AND COMMITMENT

This is perhaps one area where SC is way ahead as compared to institutions within Nepal or even with other similar institutions internationally. The project was conceived and started by Registrar Dr. Ram Krishna Timilsina, and currently the project has the full support of the Rt. Hon. Justice and other Hon. Justices. The vision has been communicated to all of the staff and a lot has been accomplished in terms of overcoming resistance to change. There have also been some token rewards tied to usage of the information system, e.g. verification of data etc which has lead to more acceptance of the system.

In addition there have been multiple events and awareness workshops, which coupled with effective communication of the vision has mean that the staff at SC have realized the value of automation and are keen on providing suggestions and identify problem areas.

2.3 OFFICE INFRASTRUCTURE

Supreme Court has already made significant investments in the necessary infrastructure for the implementation of the ICT master plan. All of the key staffs have been assigned a desktop, including the Supreme Court Judges. All of the desktop systems have Microsoft Windows XP OEM license. Networking has been already completed to bring all of the

computer systems into a network. There are also mid range servers; one being used as a DHCP, Domain Controller and File server, another being used as Web Server and Mail Server, and the remaining one being used as a database server. There is a Network Operations Center (NOC) located on the top floor of the SC building.

There is also a dedicated internet connection which the staff is using to access the internet. In addition, there is a fiber connection to the Kathmandu District Court, in a WAN setup with a server for the local domain. There is also a firewall being used for the Internet connection and the WAN connection.

Figure 3.1 shows the current logical layout of the network.

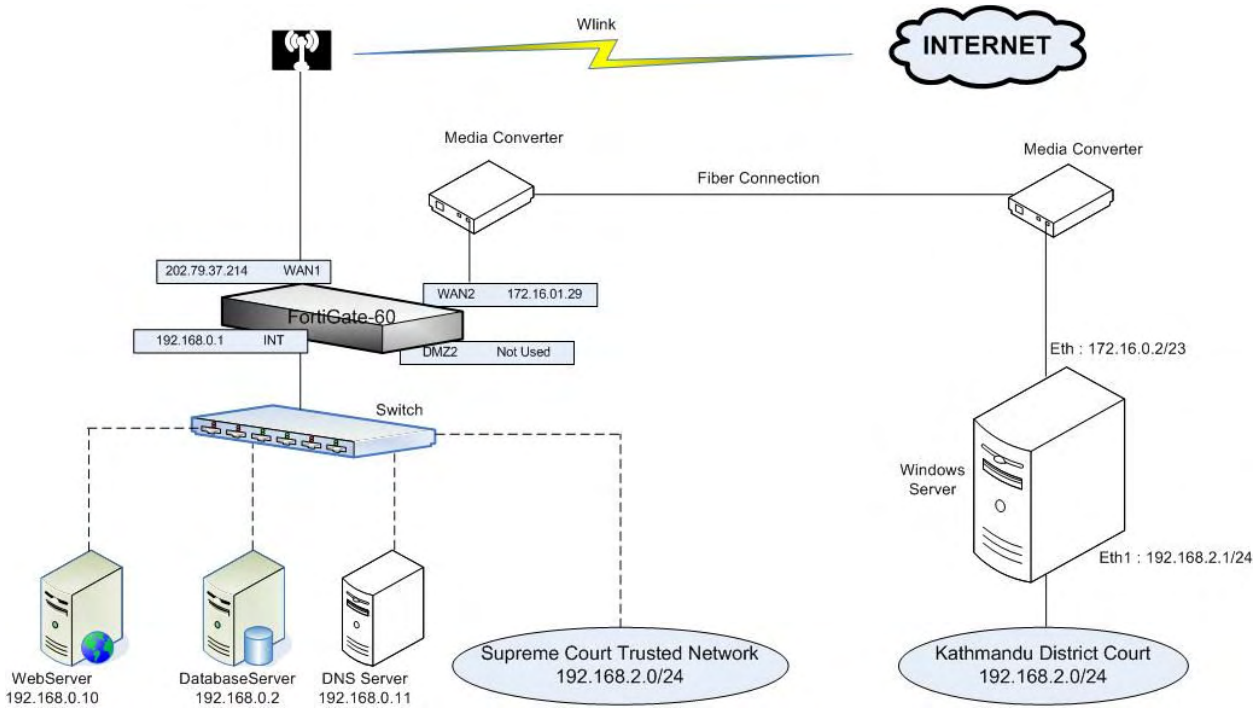


Figure 3.1 Supreme Court Network Diagram.

There have also been computer desktops deployed at the pilot appellate court and district courts. Table 3.2 shows the inventory list of these systems.

No.	Location	Total Desktop	Server	Printers	Total Network Components	Remarks
1	Supreme Court	300	3	50	15	
2	Patan	35	1	1	3	
3	Pokhara	23	1	5	3	
4	Butwal	20	1	5	2	
5	Baglung	18		5		
6	Hetauda	20	1	5		
7	Janakpur	20	1	5		
8	Nepalgunj	18		5		
9	Tulsipur	2		1		
10	Surkhet	18		5		
11	Dipayal	4		1		
12	Mahendra Nagar	2		1		
13	Jumla	2		1		
14	Ilam	18		5		
15	Dhankuta	18		1		
16	Biratnager	19	1	5		
17	Raj Biraj	19	1	5		
18	Kathmandu District Court	59	1			
19	Bhaktapur District Court	15		5		
20	Patan District Court	17	1	1		Case Management Software is also deployed
21	Other District Courts	30	1	1		
	Total	677	11	63	**23**	

Further more, there have been some levels of deployment of office automation applications. All of the users have access to Word processing application, internet access through browsers, and about 100 staffs have been assigned email addresses.

2.4 INFORMATION SYSTEMS

The information system refers to all of the automated systems required to automate the judiciary. There have been some major developments in the information systems area. One of the biggest achievements has been to get users to use the system. Even with many

constraints the usage of the information system at SC is arguably the most in any governmental agencies in Nepal and it is a remarkable achievement.

Legal Information System (LIC)

A Legal Information System (LIC) has been developed and is already deployed at the SC. This system was initially developed by a vendor about 3 years ago but failed to deploy because of problems in the system. A new team was contracted under Mr. Dipak Timilsena, and the LIC has been made operational with extensive modifications and major milestones have been reached. For last l year it was running parallel to the manual system, and recently is being deployed in the live environment. All new cases are registered in the system and cause list is automatically generated. Case status is also being updated and there are display monitors which display the current proceedings of cases at the SC. There are also provisions to enter the orders and decisions and update the status accordingly. This system has also contributed heavily on creating awareness and there is a lot of interest from the staff as well as the public about the automation of Judiciary.

From a technical perspective the LIC is developed on client-server architecture, with Microsoft Visual Basic as the programming language, and Oracle as the Relational Database Management System.

This system has been deployed at SC, and is also deployed at the Kathmandu District Court.

Additionally a separate Case Management System has been deployed at Patan District Court, and Special Court, through USAID/ARD Rule of Law Project and is currently being used parallel to the manual process. This system is also Microsoft Windows based and Microsoft Visual Basic is used as the programming language.

Information Dissemination System

There has also been progress on Information Dissemination System which is integrated into the current website, and acts as a portal for various stakeholders. Users can view the daily case status and further query to see the current status of individual cases. The mechanism is

already there to see full decisions for the cases, orders and case process details. This has been developed using PHP language and the Apache Web Server.
Another key aspect of this is that there have been multimedia monitors deployed in SC, at Office of the Attorney General and BAR Association where users can view the current cases being heard or processed and their current status.

Personnel Information Management System

A Personnel Information Management System has also been developed but is not completely deployed.

Library Management System

A small Library Management System has also been purchased and deployed in the library. It is developed using PHP and MS SQL Server.

2.5 OPERATIONS AND MANAGEMENT

All of the IT operations and Management has been under the guidance of the Registrar. A joint registrar has been assigned to oversee the overall IT operations. The technical operations and management of the IT functions has been outsourced. Currently there are 13 support staff dedicated for the development, operations, and management of the system at Supreme Court and are also being used for deployment at pilot courts.

Table below lists the roles and functions of the IT operations team

Role	Qty.	Function
MIS Director	1	Oversee all aspects of the IT implementation including providing input into planning, budgeting and execution.
Team Lead	1	Provide guidance to the team, and lead the operations, development and implementation effort.
Software Programmer	2	Development, Maintenance of the LIC

Web Developer	1	Development of the Public Information Dissemination System
Network Administrator	3	Network administration, Trouble shooting, Help desk
IT Legal Advisor	1	Provide functional input for the LIC and provide testing assistance
Data Entry Person	4	Data entry into the system.

2.6 END USER SKILLS DEVELOPMENT

There have been some major accomplishments in terms of the skill development at the SC. Most of the staff with assigned with a computer have some knowledge on the operation. A formal **System Operational Training** has been provided to about 120 staffs, which consists of PC Fundamentals, Office Applications and Nepali Typing. There are also ongoing trainings on the use of the LIC. A lot of informal but on the job training has been provided to most of the staff. **The level of computer skills at SC is varied and changes frequently due to transfers and re-assignments**.

The table below shows the level of expertise of the staff

Level	**Qty**	**Remarks**
Moderate	60%	Able to fully operate the desktop including office applications and email, and browsing. Also have typing skills
Basic Usage	20%	Ability to use word processors, and some internet browsing etc.
No Skills	20%	No computer skills.

Table 3.5.1 Computer Expertise of the Staff

There has also been some training that has been provided at the Patan Appellate Court, and other pilot courts. At Patan District Court 4 users have been trained on System Operation and basic hardware configurations.

3. GAPS

Although there has been a significant progress towards the implementation of the IT master plan at SC, due to various constraints and limitations some gaps exist.

3.1 POLICY

Even though there are a lot of initiatives and policies have been addressed at the planning level, there are no documented operational policies. For e.g. there have been various rewards given for the usage of computer resources, but confusion still exists because of lack of documentation. The staffs that are being transferred to SC also do not have a formal basis for understanding the changes or the implementation, since there are no documented policies to guide the handover process.

In terms of usage of the system also, the policy is not documented, which means most of it is done on ad hoc basis. This can lead to staff not being able to properly conduct their jobs, security lapses, and other unintended consequences.

3.2 HARDWARE AND INFRASTRUCTURE

This is perhaps one of the biggest area where there seems to be some major gaps and needs some immediate attention. Some of the basic things like secured NOC, proper backup facilities, Disaster Recovery Center, proper power backup systems, scalable enterprise level servers and secure web servers are lacking. This coupled with the architecture of the information systems means that the performance, security, scalability and stability of the system can be easily compromised.

Currently the available servers are used for multiple functions, and data itself is also stored in the servers. This means that if one application fails it has the potential of disrupting other applications or systems. There is also no redundancy, which means that if a problem arises in the information system, and needs to be fixed, there are no options but to stop users from using the system till the fix is made. Once data intensive applications like Document

Management Systems are deployed, the storage capacity, and degree of availability will rise exponentially.

Power back up is another area where there is a gap currently, because of the load shedding schedule and heavy maintenance needed for the currently available generator. There have been times where the power failure has meant that the complete work has been stopped, news of which was also published in the local papers.

There are also some gaps in terms of office automation applications. The use of email for communicating within the SC or other courts is not prevalent. There is also no intranet sites where users can interact and share resources or have discussions on different topics related to their daily activities.

Finally, the currently assigned bandwidth of 256Kbps is shared between the users accessing the internet from SC, and from external users trying to access the SC web portal.

3.3 INFORMATION SYSTEMS

The currently deployed information systems are not sufficient for the overall automation of the Judiciary. The initial system was initially developed over 3 years ago, using technology that was already several years old at that time. The following gaps exist in the current system:

1. The technology and the architecture used for the development of the LIC limit its scalability and deployment in a centralized way, thus cannot be sustained for a long time. For e.g. for district courts to access the information at SC, or vice-versa, a high speed connection is required, which is not feasible given Nepal's IT backbone.
2. There is lack of proper documentation of the system, and there are no standard processes defined which leads to difficulty in adding functionality and maintenance.
3. There is no system analysis document, or database designs, which means the database is not tuned for optimal performance, which leads to long response times when running the system.
4. There is no "test" or "play" environment where some level of testing can be performed before deploying modification.

5. The system is not functionally complete.
6. There is a heavy dependency on the IT staff for the usage of the system, and the development team itself is focused on support, thus taking away time from development.
7. A lot of requirements are given on an ad-hoc basis, and the requirements have a tendency to change or become contradictory because some of the judicial process is not well defined even for the staff at SC.
8. There are not enough resources for the maintenance and enhancement of the system.
9. The 'up-time' of the system is compromised because of no failover mechanism, which can lead to frustrated users.
10. There is no Manual or help file for the system.
11. Most of the updates, fixes and issue tracking is done on ad-hoc basis and a process for maintenance is lacking.
12. There is use of propriety software in the development which means that the licensing and annual maintenance costs for the software is also substantial.
13. Secured servers, and encryptions are not used for the web access which posses security risks.
14. Administration and Office Automation systems are not deployed.

The software system deployed at Patan District Court is also used parallel to the manual system. This system also has the same issues as mentioned above, and the users are hesitant to completely rely on the system because of lack of backup facility, ownership issues, and lack of operations policy.

3.4 TRAINING AND END USER SKILL DEVELOPMENT

The training and end user skill development is one of the most crucial aspects because the system can only be beneficial if there are trained users getting the maximum benefit of the system. The nature of IT resources is such that a lot is learned by hands on experience related to their daily tasks. There fore the trainings are of different levels, from training the users on the usage of the computers to the usage of office application to the actual information systems. The general complaint of the users regarding the training has been that they have found on the job training to be more effective than trainings they have

attended. For E.g. the users at Patan Appellate court have been trained on the usage of computer systems before the systems arrived, and now, when they have some minor questions they don't have any resources who can guide them, thus not only can they not move forward, but have a tendency to not use the system once they get to a point from where they cannot move forward.

3.5 OPERATIONS AND MANAGEMENT

The number of staff that are currently available for operations and management of the IT resources are not sufficient to realize the vision and goal laid out in the ICT Master Plan. For any IT implementation of this magnitude, the initial investment in IT staff will need to be high, and will be phased out as the systems are operational, and the maintenance can be carried out by a small team. However currently the IT staffs are not only developing new functionality but are supporting the users, provide informal on the job training, create awareness and resolve issues in the system at the same time. In addition, there are instances where the IT staff have to spend their time identifying the judicial process and then communicate them to other staff.

Also due to lack of proper hardware infrastructure, significant amount of their time is being invested in providing mechanisms for backup of the system. For e.g. every night all of the data that has been entered into the system is printed out and kept as a backup to prevent data loss in case of system failure.

Additionally, there have not been any dedicated staff or teams assigned for the technical operation of the systems deployed at Patan Distric Court and the Special Court.

3.6 DISSEMINATION OF INFORMATION

Currently the only means of dissemination of information to the various stakeholders is thru the use of internet, or the display monitors located in SC and at the supporting entities. For e.g. a stakeholder with no access to internet, but access to a phone line does not have any way of getting the relevant information.

4. RECOMMENDATIONS

In order to realize the vision of the automating the judiciary, a complete holistic approach has to be taken because all of the above mentioned gaps are related and dependent on one another. Thus the recommendations have been made to not only realize the vision but also to make sure that the system is sustainable, have low cost of ownership, and can handle the workload for the next 10-15 years.

4.1 POLICY AND PROCESS

The policy refers to the authoritative guidelines for the usage, implementation and operation of the systems and processes refers to the course of actions to be taken to achieve a result. For e.g. there can be a policy document for registration of cases which states that "all new cases needs to be registered in the information system" and a process document would state the steps to be taken for registering the new case into the system. Thus the policy and processes needs to be documented so that users and stakeholders have a clear understanding of not only the impact on their jobs but also the expectations of using the ICT systems. The policy should deal with the following areas:

Policy for promoting office computing in all of judiciary - This policy should deal with the issue of promoting office computing in all courts, and it should start with SC. It should be expanded to other courts.

Policy for IT involvement in judiciary – This refers to the policy for IT involvement in changes in processes or other judicial matters. As SC becomes more dependent on IT, it is imperative that all major decisions for the functioning of SC give due consideration to the impact on existing and future IT systems and infrastructure.

Policy for user access to systems - This refers to the security and user privilege policies that are applied to the system. For e.g. the policy should define roles that can register a case, enter case details and decision and other function. Currently this kind of policy is applied on an ad-hoc basis, depending upon the need.

Policy for training of users including tying rewards to usage of computer resources- This policy should deal with the different training requirements for the users to use the computer resources, and it should also have mechanisms to reward users based on adapting new technology or using computer resources. For e.g. departments that are using computers to do most of their jobs can be rewarded with incentives etc.

Policy for functional areas - This policy should deal with the acceptable level of electronic communication that can be substituted for paper documents. For example, if a case is registered in the system (without any manual registration), the policy should clearly state that such registered cases are legally and authoritatively valid. Other example include, publishing case orders from the system.

Policy for disseminating information - This policy should address the mechanism for disseminating information to various stakeholders. For e.g. what kind of information should be published in the website, and what information should not be published.

Policy for managing ICT related inventory, upgrades - This policy should deal with the management of ICT related resources, and the chain of authority for providing upgrades etc.

Policy for open source technologies - The prevalence of open source technologies in today's organization is expanding, and the total costs of ownership for the systems are significantly lower when open source technologies are used. Thus the policy should cover whether to use open-source vs. proprietary licensed products.

Generally most of the process for using of the information system will be covered in the operational manual. However, additional process documentation is needed in the following areas:

Process for staff Orientation and handover – This should deal with the process for orientation of new staff to the existing system, and also the handover process for transferring staffs.

Process for Functional Areas – This should include the process for defect reporting in the information systems, issues with computers and related software and also the escalation procedure. It should also include process for completing tasks if the system is unavailable. For e.g. if the system is unavailable due to power failure, then document should list the course of actions to be taken to register a new case, and the course of actions to be taken once the system is back online.

4.2 HARDWARE AND INFRASTRUCTURE

The recommendations given for Hardware and infrastructure have taken the following considerations:

1. The volume of data will grow exponentially
2. The number of users will also consistently grow
3. As more users use the system and the processes are automated, the need for fast access, increased uptime and historical data increases.
4. The need to store data securely.
5. The need to have effective communication within SC, with Appellate Courts, and District Courts.

Office Applications

Even though Microsoft Office application is already being used in some level at the SC, none of them are licensed. It is recommended that licensed office application be deployed including an email server which will have email accounts for all of the staff who are using computer resources. As an alternative, open source office applications like Open Office and E-mail programs like Thunderbird can be deployed for cost saving.

NOC

It is recommended that the current NOC be upgraded to make it more organized and secured, and be changed to a Data Center. All of the existing servers should be mounted in

racks, and there should not be any equipment on the floor. A security card mechanism needs to be installed so as to prevent unauthorized access. There should also be a separate climate control system for the NOC to keep the room at an appropriate temperature for the servers. All of the servers and other equipment need to be labeled. It is also recommended that the flooring not be covered with carpet, but tiles so as to minimize static discharges.

Furthermore, a separate area needs to be created as a small meeting room for the IT development team to have meetings and be used as a presentation room for visiting stakeholders.

Servers

The nature and function of SC means that not only is a high volume of data is generated, but there is also a need to access historical data. Once all of the courts are brought under the network and the functions are fully automated, the amount of data will grow exponentially and the number of users creating, accessing and storing will also grow significantly.. Therefore the current specification of the servers will not be able to handle the workload in terms of performance or storage. In addition, there is a need for creating redundancy so that is there is a point of failure somewhere the whole system is not impacted.

Thus the following are recommended:

1. Existing servers be used as Domain Server, Email Server, and Files Servers.
2. Enterprise Level servers, and application servers be deployed for the running of the information systems.
3. All servers should be rack mounted so as to save space.
4. A clustering mechanism is used so as to create higher availability.
5. A redundant Storage Area Network should be created so as to make the storing, retrieval and expansion of data efficient and scalable.
6. Small Size Server should be bought for the remaining 10 Appellate Courts.
7. Open Source OS or OS bundled with hardware be used so as to minimize total cost of ownership.

Disaster Recovery Center (DRC)

Furthermore, given the sensitive nature of the data and the need for data integrity and availability it is recommended that a Disaster Recovery Center be created in the adjoining building so as to mitigate the risk of data loss, corruption etc whether it be thru mal-intentions or natural disasters.

The following figure illustrates the logical layout of the servers, storage devices and the connectivity to the DRC

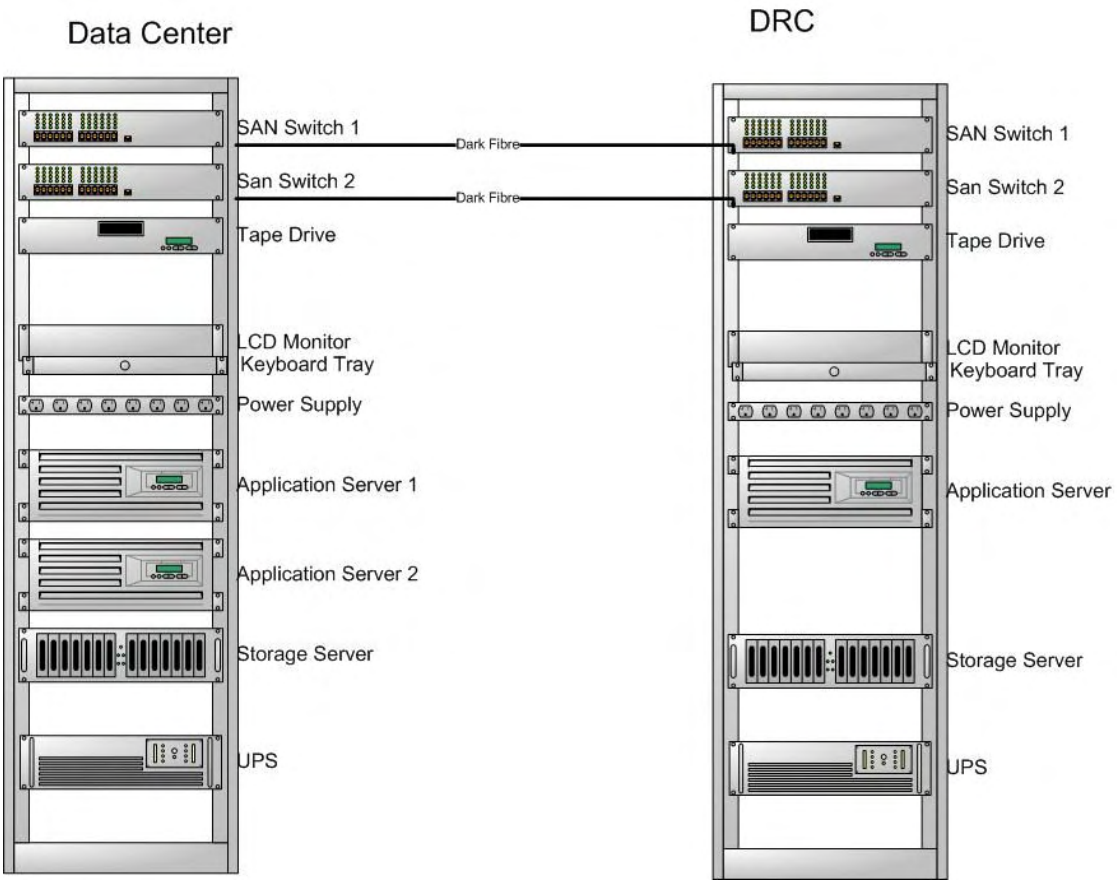


Figure 4.2 Layout of the Data Center and DRC (Note: The Fibre Connections between the devices and the Connection to the LAN is not shown)

Communication

Considering the centralized nature of data and the ease of accessibility, it is recommended that connectivity options be consistently evaluated so as to get the best use of the existing

infrastructure. It is recommended that the internet connection pipeline be increased to 1Mbps.

NTC has already made significant progress in providing cheaper high speed connection, and backbone connectivity within the Kathmandu Valley and in the Terai districts. Therefore it is recommended that SC use this backbone to create a WAN for the valley courts. Furthermore CDMA telephone coverage is already available in 55 districts and is planned to reach all 75 districts within 2 year, thus SC can utilize this network to connect the district courts.

Tele-case query

It is also recommended that a means of accessing the system through the telephone be deployed. This will allow stakeholders who do not have access to the internet, or are unable to use the web, a mechanism to find information about their case through the telephone. The system would be automated and the users can follow prompts to get the needed information. Similar system is deployed by many governmental agencies in other countries, like the U.S. Citizenship and Immigration Services.

Third party software licenses

It is also recommended that the licenses be purchased for all of the office applications that are being used and also for the database management system. The software applications that are used currently without license are:

1. Microsoft Office 2003 Standard Edition
2. Symantec Corporate Edition Antivirus Software for Network Servers and Workstations.
3. Oracle 9i
4. Microsoft Exchange Mail Server

Power Backup

It is recommended that a new power generator be immediately deployed for continued operation during power failures.

This is another area where there is a gap currently, because the currently available generator needs heavy maintenance. There have been times where the power failure has meant that the complete work has been stopped, news of which was also published in the local papers.

4.3 INFORMATION SYSTEMS

Based on the systems proposed in the IT Master plan and the current deployment, in order to make the information systems sustainable, user friendly and functionally adequate, while realizing the vision of automation of judiciary, it is recommended that investment be made in developing new ERP systems that use vendor-neutral and current architecture, while maintaining the current ones for the next few years.

The needs of the SC in terms of Information Systems can be categorized in the following way:

Case Management System (CMS)

This is the core system and would encompass all the functionality already present in the current version of LIC, and have other functionalities related to the core function of the Supreme Court. They would also consist of any supporting systems like system to enter 'Tippani" and database of Lawyers and Judges.

Administration Systems (AMS)

These systems would cater to the various administration departments within SC. They would consist of Human Resource Information System, Finance Information System, Inventory Management System and Library Management System.

Document Management System (DMS)

This system will be the primary means of storage of all documents generate by SC. It will be closely tied with other information systems and should have functionalities to publish information to intranet or web portal. This system will form the main registry of documents, where users can search for documents, tie them to cases or other functions.

Monitoring and Evaluation System (MES)

This system would use all of the above mentioned systems to provide evaluation and monitoring capabilities for SC.

Web Portals (WP)

This would provide interaction with the above mentioned system for various stakeholders. External users will be able to see status of their cases through the website, registered lawyers will be able to e-file cases etc. Internal users will be able to log in to the system to perform limited tasks, and also be able to use the intranet, which will provide facilities for sharing internal information.

The architecture of the above mentioned systems should be such that they are deployed in a centralized way with mechanisms for the courts to work on offline mode. This means that they should have a common database, and information should flow seamlessly. The system should operate with just basic connectivity like through dial-up lines, and the users should have the ability to view cases from other courts as authorized. Therefore it is recommended that the systems user web based technologies.

Additionally, dedicated teams are needed for the support and deploy the current system, and for developing the new system.

The following recommendations are being made to maintain and update the current system:

1. A team consisting of one team lead and two developers be assigned to maintain the current system.
2. A User Manual should be prepared for the users.
3. Some level of documentation should be done of the current system in order to make maintenance easier, and also provide as an input into the new development.
4. A change management process should be developed.

New development

1. Separate teams need be formed to develop the new systems.
2. The information systems should be centralized, so that different systems are not deployed at different DC or other courts.
3. Proper software development process should be used to develop the systems.

4. The architecture should be modular so that components can be developed incrementally and as needed.
5. The architecture layers should use current vendor-neutral standards.
6. Current technologies like Java, J2EE application servers and open source data bases like MySql should be used to develop the system so that the system is scalable and sustainable.
7. The development framework should be web-based, meaning that any authorized personnel with a browser and internet connectivity will be able to use the system.

The figure below shows the functional and technical architecture of the systems.

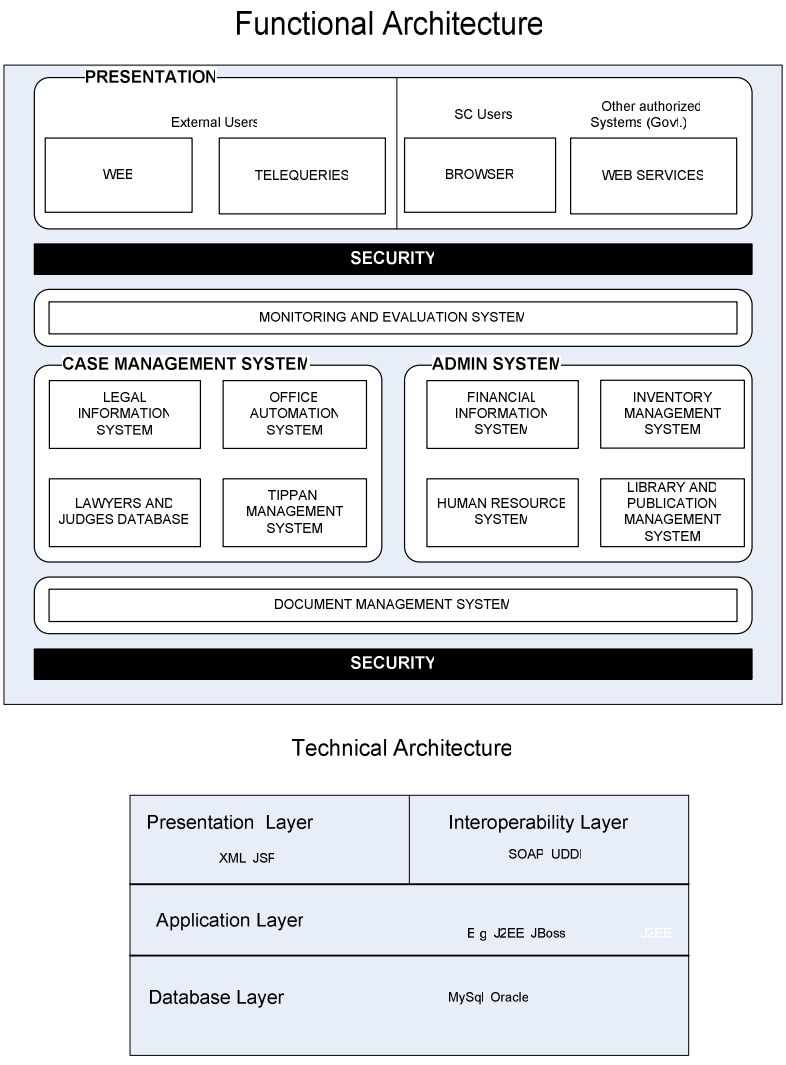


Figure 4.3 - Functional and Technical Architecture of the Information Systems

4.4 END USER SKILL DEVELOPMENT

Since most of the users at SC are already familiar with the basic operation of the computers, the focus at SC should be to train the remaining users and develop capacity within SC to train new users, or transferred users. However for the appellate courts and district courts more training is needed. Some designated staff from each department at SC and the other courts need to be trained on basic troubleshooting and network basics. It is also recommended that SC staffs that are going to be involved in the development of the new system need to be trained on the basic software development process in order to expedite the development process. The table below lists the training modules that are needed.

Additionally, it is also recommended that a team consisting of high level SC and IT staff involved in the SC IT process visit and observe a similar deployment in another country (e.g. India) in order get a better understanding of ERP systems, DC, and DRC.

It has been noted that for the training of LIC, a dedicated resource is required temporarily, so as to do on the job training and help the users with the functionality of the system. One of the major concerns from Kathmandu District Court was the lack of resource to explain the functionality once a newer version is released or even and existing functionality.

The following table represents the types of training for the different level of users:

Type of training	Level Of Users
System Operational Training	All Users from Appellate courts and District Courts and remaining and transferred users to SC (60)
Troubleshooting and Network Basics	Designated staff from each department at SC and the other courts
Information System	All users based on roles (as and when the systems are ready)

Software Development Process	SC Staff that are going to be involved in the development of the new systems.
Observation Tour	Designated Staff
Performance Tuning of the Database and Software Development Process	Current IT support staff

As the users at SC get trained on the usage of the system, it is recommended that SC form a training team internally that can provide the implementation training and support. For this some kind of reward mechanism might need to be developed.

4.5 OPERATIONS AND MANAGEMENT

The implementation and maintenance of the ICT infrastructure takes a significant amount of effort and a dedicated staff base. Although it is desirable to have a team of dedicated IT staff present to manage and maintain the systems, this is not feasible at SC due to lack of additional manpower, thus outsourcing of these expertise is recommended. Just the amount of IT related hardware and infrastructure that is currently deployed and will be in the future, means that a significant number of resources are required. However once the users get more familiar with the system and functionality, the no of teams need to be phased out.

4.5.1 ICT Steering Committee (ICT SC)

An ICT Steering Committee with the Registrar as the chair, and consisting of high level officers and representation from Justices (if possible) should be established providing a mechanism to:

- Formulate policies related to ICT services
- Define processes for different aspects of ICT services, e.g. Software defect resolution process, Enhancement process, computer
- Consistently evaluate the expertise of users, usage of ICT resources, trainings and update policies and process based on the evaluations.
- Monitor, Control the activities arising from implementing the services
- Determine/Approve adjustments to the master plan
- Budget for the cost of management, maintenance, operations of the ICT infrastructure and services

- Initiate/Maintain contact with vendors for services that are outsourced
- Prioritize the implementation of ICT Systems
- Co-ordinate with other Government Agencies in lieu of their ICT plans (E.g e-governance) and offer recommendation.
- Designate owners for various aspects of the ICT infrastructure (E.g Web site, Information Systems, Trainings etc)

Since it will not be feasible for ICT SC to complete all activities mentioned above, smaller sub-committees or owners can be formed to carry out the activities.

4.5.2 ICT Management Functions

Core Functions	Areas Covered	Responsible unit
User Support and Help Desk	First line technical support to users	Outsourced/Internal designated SC Staff
OS and Network Management including User support and Security	All data communication services including the physical network infrastructure, servers, access to internet, day-to-day network operations, upgrades, performance tuning. General user administration including assigning privileges.	Outsourced
Maintenance of the current LIC	Enhancement, defect fixes, deployment and training of the current LIC	Outsourced
New ERP system	Development/enhancement the new enterprise wide system.	Outsourced
Technology Planning	ICT co-ordination, chain of command, policy development and future planning	ICT SC

Keeping in mind the recommendations for hardware and information systems and the management functions, the following teams need to be created and reorganized to manage those tasks: Network Operations and Support Team, LIC Operations Team, and corresponding teams for the development of the new information systems. There is also a need for a System Analyst/Architect who will oversee all of the technical aspects of the IT

implementation, including tuning of the current system, planning for the future system and will work closely with the SC staff.

Additionally it is recommended that a team also be formed consisting of SC staff that can train other users on computer usage, information systems and provide help with the implementation.

The following table shows the team, the no of resources involved and the areas covered.

Team	Members	Qty	Responsibility	Start Date	Total Duration	Remarks
MIS Director	Senior Consultant	1	Overall ICT Responsibilities, Project Management	Ongoing	Till End of Project	This is a core team that is needed without break in timeline for the duration of the project.
System Analyst/Architect	Consultant	1	System Analysis, performance tuning, design of the system	Ongoing	Till End of Project	
Operations Team	Network Engineer	1	Manage and Administer the Network		Till End of Project	
	Software Engineer	3	Maintain and enhance the current LIC.	Ongoing	Till End of Project	
	Network Technician	4	Provide first level user support and help desk to SC and Appellate Courts		Till End of Project	
	Database Administrator	1	Administer the Database, maintain proper documentation, and provide input into design.	Ongoing	Till End of Project	
	Web Developer	2	Maintain and enhance the current web portal	Ongoing	Till End of Project	
	Data Entry	4	Data entry and verification of data	Ongoing	Till End of Project	
Deployment Team	Software Engineer	3	Functional Enhancement for Deployment to the Apellate Courts	March 31st	24 Months	Appellate Courts have some additional requirements that are not currently covered by the LIC.
	Support Engineer	3	Configuration of the Network and support for the deployment to the Appellate Courts	March 31st	24 Months	
Information System Development Team	Architect	1	Overall responsibility for designing, managing the new development. Research and input into integrating current technology etc.	May 15th	24 months	Develop the new Legal Information System including an integrated Case Management System. Develop the Administration Systems and Document Management System.
	Team Lead/System Analyst	1	Work closely with the SC staff to provide input into the design of the system.	May 15th	24 Months	
	Sr. Software Engineers	4	Provide input in the design, and carry out the development	May 15th	24 Months	
	Software Engineers	8	Develop and test the systems as per the specification	May 15th	24 Months	
	Functional Experts	4	Provide the requirements, conduct black box testing, and verification	May 15th	24 Months	

Table 6.1 Teams

4.5.3 Information System Development Process

It is an acceptable practice to outsource all of the development of the systems to vendors, and have it deployed at organizations, and the costing is only based on the total cost of the system. However given the complex nature of functions of SC and the experiences with external systems, it is recommended that development is done at SC with external contracted partners. This way extensive involvement of SC will be guaranteed, and will go a long way in knowledge transfer of the system to the staff of SC. Additionally it will make the development process more agile, and can be tailored to accommodate various constraints as mentioned in the above sections.

It is also recommended that development should be done iteratively and major milestones and priority of the information systems be established.

5. WORK PLAN TIMELINES AND COST

5.1 WORKPLAN

The following lists the work plan as recommended in this report. The implementation details for the district courts have not been addressed as they are per the ICT Master Plan. Please refer to ANNEX A for the detailed breakdown of the project schedule.

Rank	Activity	Remarks
1	Setup ICT SC, and document the policy and process	Co-Requisite
2	Observation Tour	Co-Requisite
3	Setup of the Operations and Deployment Team	Co-Requisite
4	Setup of the Data Center and Disaster Recovery Center	Co-Requisite
5	System Operational Training for 15 AC	
6	Communication Upgrade and Connectivity from AC to SC	Can be done in phases
7	Networking for Appellate Courts	
8	Deployment at 16 AC	
9	LIC Training at 16 AC	
10	Setup of the Information System Development Team	
11	Training on Software Development Process	
12	Develop the new Case Tracking and Management System	
13	Develop the Monitoring and Evaluating System	
14	Develop the Document Management System	Can be developed concurrently to 12
15	Development of Administration Systems	
16	Migration to the new system	Can be done in phases

5.2 COST ESTIMATES

The following table shows the costing estimates for the activities that need immediate implementation and modification to the ICT Master Plan. The costs associated with other activities like infrastructure, training, training and connectivity for the District Courts are as per the IT Master Plan.

S.N	Activity	Cost
1	**Observation Tour**	**25,000**
2	**Generator for power backup**	**50,000**
3	**Networking at 15 AC**	**25,000**
4	**Training at 15 AC**	**25,000**
5	**Small Size Servers for Remaining AC**	**50,000**
6	**LIC Training and Configuration**	**10,000**
7	**Internet Connectivity Upgrade Cost**	**12,000**
8	**Setup of the Operations Team**	

Team	Position	Qty	Monthly cost	Cost for 12 Months ($)
MIS Director	Senior Consultant	1	2000	24,000.00
System Analyst/Architect	Consultant	1	1500	18,000.00
Operations Team	Network Engineer	1	500	6,000.00
	Software Engineer	3	400	14,400.00
	Network Technician	4	300	14,400.00
	Database Administrator	1	500	6,000.00
	Web Developer	2	300	7,200.00
	Data Entry	4	150	7,200.00
Deployment Team	Software Engineer	3	400	14,400.00
	Support Engineer	3	300	10,800.00
Total				**122,400.00**

9	**Setup of the DC and DRC**				
	Item	**Data Center**	**DRC**	**Cost per unit ($)**	**Total**
	RISC Server	2	1	50000	150,000.00
	SAN Switch	2	2	1300	5,200.00
	Storage Server	1	1	100000	200,000.00
	Rack (with Monitor, KVM switch)	1	1	16000	32,000.00
	Tape Drive	1	1	10000	20,000.00
	UPS 5KVA	1	1	15000	30,000.00
	Training	Item		10000	10,000.00
	AMC (12%)	Item		52464	52,464.00
	Contingency (10%)	Item		20230	20,230.00
	Total				**519,894.00**

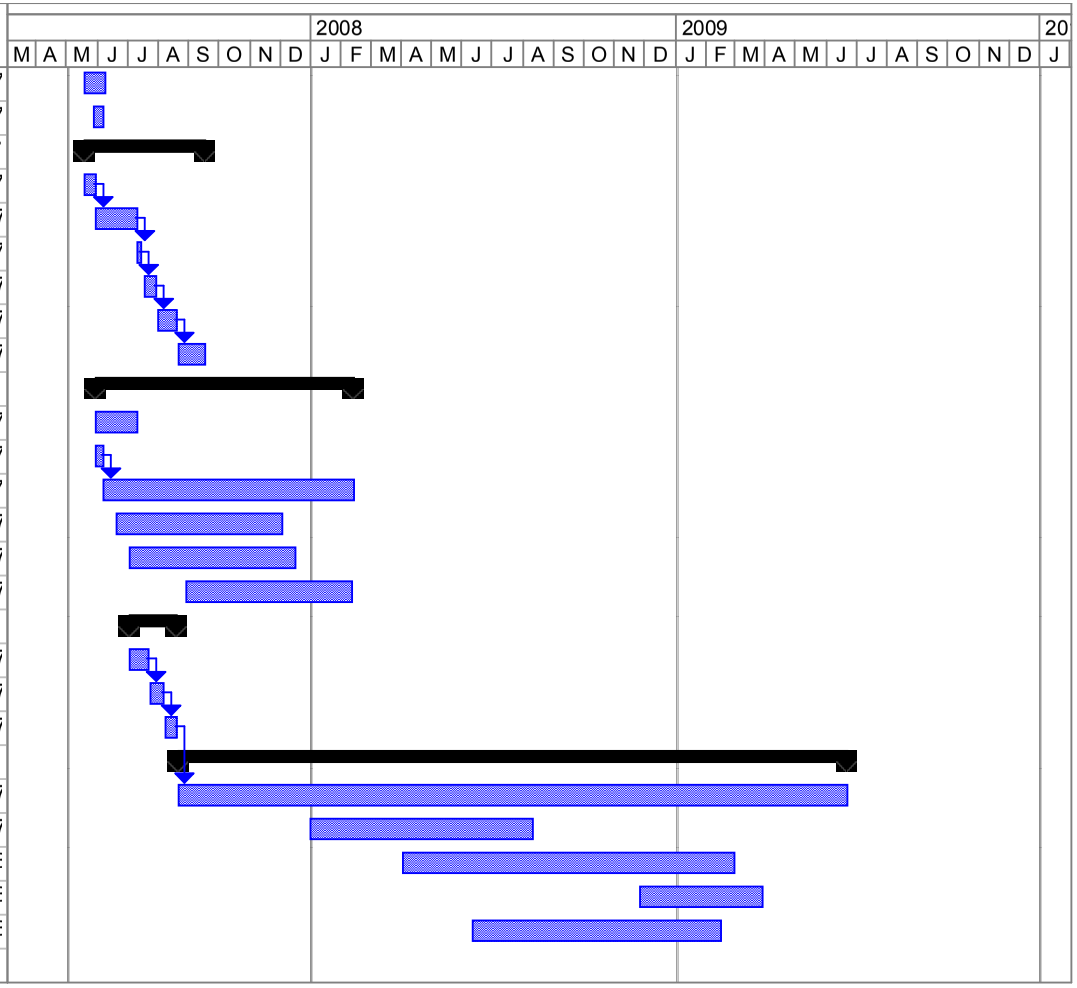
10	**Setup of the Development Team**			
	Position	**Qty**	**Monthly cost**	**Cost for 12 Months ($)**
	Architect	1	1000	12,000.00
	Team Lead	1	1000	12,000.00
	Sr. Software Engineers	4	500	24,000.00
	Software Engineers	8	400	38,400.00
	Functional Experts	4		0.00
	Total			**86,400.00**
11	**Grand Total**			**925,694.00**

Table 5.2 Cost Estimate

6. ANNEX

6.1 ANNEX A. GANTT CHART OF THE PROJECT SCHEDULE AND TIMELINE (PROPOSED)

Task Name	Duration	Start
Setup the Operations Team and Deployment Team	15 days	Fri 5/18/07
Observation Tour	7 days	Sun 5/27/07
Setup of the Data Center and Disaster Recovery Center	**87 days**	**Fri 5/18/07**
Preparation of Specification and Tender Document	7 days	Fri 5/18/07
Call for Tender for Hardware	31 days	Mon 5/28/07
Evaluation of Tender and Award of Tender	4 days	Tue 7/10/07
Installation of Servers	10 days	Mon 7/16/07
Training of Staff	15 days	Mon 7/30/07
Migration of Database	20 days	Mon 8/20/07
Deployment at Appellate Courts	**185 days**	**Tue 5/29/07**
Purchasing of Hardware (Servers)	30 days	Tue 5/29/07
Setup of the Deployment Team	5 days	Tue 5/29/07
System Operational Training for 15 AC	180 days	Tue 6/5/07
Networking for Appellate Courts	120 days	Mon 6/18/07
Deployment at 16 AC	120 days	Mon 7/2/07
Training at 16 AC	120 days	Mon 8/27/07
Setup of the Information System Development Team	**35 days**	**Mon 7/2/07**
Selection Process	15 days	Mon 7/2/07
Formation of Team	10 days	Mon 7/23/07
Orientation and Training	10 days	Mon 8/6/07
Development of Information Systems	**480 days**	**Mon 8/20/07**
Develop the Case Tracking and Management System	480 days	Mon 8/20/07
Develop the Monitoring and Evaluating System	160 days	Mon 12/31/07
Develop the Document Management System	240 days	Mon 3/31/08
Migration to the new system	90 days	Mon 11/24/08
Development of AMS	180 days	Mon 6/9/08



6.2 ANNEX B. HARDWARE SPECIFICATIONS FOR DATA CENTRE AND DRC

1	**APPLICATION SERVER**	
	Item	**Specification**
	Node Type	Rack Mountable
	Processors	64 bit RISC, in a 4 processor setup
	Clock frequency	1. 1 GHz 64-bit RISC or More
	Cache Size	L2 Cache : 3MB (4-way) or more, L3 Cache : 70MB (4-way) or more
	Memory	16GB memory ECC DDR-2 SDRAM memory and expandable up to 64GB
	DVD Drive	One
	Tape Drive	36/72GB 4mm Internal Tape Drive
	Performance Benchmark	TPC Result should be 260,000 or more in 4 CPU Platform. Also SPECint2000 should be 1700 or more & SPEfp2000 should be 3300 or more in Single CPU platform.
	Processor-to-memory bandwidth, L2 to L3 cache bandwidth and I/O subsystem bandwidth	Processor-to-memory bandwidth should be 40GBps or more ,
		L2 to L3 cache bandwidth is 65GBps or more and I/O subsystem bandwidth should be 10GBps or more
	Service Processor	One Service Processor is required
	Dynamic Processor & PCI Slot dealloacation	Required
	Domains/Partitions/ LPARs	System should have the capability to support dynamic Logical partitions
	Internal Hard Disk for	2 X 146GB 15,000 RPM SCSI Disk Drive with Mirroring for Operating System
	I/O Slots	Minimum 5 hot plug PCI –X adapter
	Redundant hot-plug power supply & cooling fans	Required
	Ethernet Port	Three (3) 10/100/1000Mbps Ethernet NIC
	Fibre Channel Adapter	Two (2) Gigabit Fibre Channel PCI-X Adapter (4Gbps) to connect Storage Box
	SCSI Adapter	SCSI Adapter is required
	Cluster Components	As required for two Servers (Vendor's Own Cluster Solution for Two Servers)
	Operating System	Pre installed 64 Bit Operating System
2	**EXTERNAL STORAGE SERVER**	
	Storage Controller	Dual 4Gbps capable, redundant and hot-swappable, battery backed, write cache mirroring.
	Drive interface	The storage shall be End-to-end 4 Gbps capable Fibre Channel interface technology
	Host Port and drive ports	Minimum Eight 4Gbps FC Host ports and Four 4Gbps FC drive ports
	Cache Details*	Minimum Two GB Per Controller
	List of RAID Support*	0,1,3,5,10
	Storage Partitions / LUNs	• Minimum 8 Storage Partition and 1024 Luns
	Cached Read IOPS	• Minimum 120,000 or more
	Disk Reads IOPS	• Minimum 44,000 or more
	Write IOPs	• Minimum 9,000 or more
	Cached Reads MB/s	• Minimum 1500 or more
	Disk Reads MB/s	• Minimum 990 or more
	Disk Writes MB/s	• Minimum 850 or more
	Supported drives	• 2Gbps FC: 15K rpm, 146GB/73GB/36GB
		• 2Gbps FC: 10K rpm, 300GB/146GB/73GB
		• 4Gbps FC: 15K rpm, 146GB/73GB/36GB

	Storage capacity	• The storage array shall be configured with 2TB usable capacity in RAID 1+0 using 4Gbps 146GB 15K rpm 4Gbps FC Disk Drive with 10% hot spare. • The storage array shall be scalable to at least 8TB usable capacity with RAID1+0 using 146GB Fiber Channel disk.
	Fans and power systems, Controller	• It shall support hot plugging and hot swapping of all components on-line (i.e. disks, power supplies, cooling fans) with no disruption to any application. • `The storage array shall be fully redundant, highly available with redundant components (power supply, cooling fans, etc.).
	OS support	Should support Windows 2000/2003, Solaris, Linux, HP-UX, AIX, etc.
	Hot-swappable disk bays	Required
	Dynamic Capacity Expansion and Dynamic RAID Level Migration	Required
	Multi-path and load balancing	Required
	High Availability/Fault tolerance	Required
	Redundant Power Supply	Required
	Redundant Cooling Fan	Required
	Availability at LAN for Management	Required
	SAN Management software	Required
	Local Replication	Required
	Remote Replication /Snap Shot/Volume Copy/Remote Mirroring software should be compatible with existing Storage	Storage to Storage online remote mirroring feature enabled to send data replication from Data Center to DRS center storage via SAN switch connectivity(Sync/ Async Both automatically)
	Rack Mounted	Required
	Performance Benchmark	Any Performance benchmark 3rd party published to be submitted
3	**SAN SWITCH**	
	Brand	Same brand as RISC server
	Form Factor	19 (nineteen) inch rack mountable,
	Number of ports	Minimum Six (6) 4Gbps SW SFP Transceiver & Two (2) 4Gbps 10 Km Ext Distance LW SFP Transceiver and the Switch should be upgradeable upto 16 Ports
	Port Bandwidth	At least 4 (Four) Gbps non blocking – higher preferable
	High Availability	Hot code activation, single field replaceable unit etc. required – please specify
	Security Features	Yes
	Manageability	Web Based Interface
4	**EXTERNAL TAPE DRIVE**	
	Interface	LTO - 3
	Number of Drive	One
	Number of Tape Cartridges	One
	Capacity per cartridge	Up to 800GB per cartridge compressed; 400GB native
	Sustained data transfer rate	Up to 80MB/sec native
	Rack Mounted	Required
	Cartridges	At least Twenty (20) data cartridges and Three (3) cleaning cartridges should be provided
5	**OEM RACK AND ACCESSORIES**	
	Capacity	42 EIA Units
		Rear and Front Door: 1098 mm (43.3 in)
		Power strip – 7 way, 2 units
		Rack Security Kit
	Monitor /KVM	LCD 17-inch monitor which occupies only 1U
		KVM switch that allows control of upto 8 servers from a single console

6.3 ANNEX C. LIST OF MEETINGS AND OFFICIALS MET

Meeting	Attendees	Personnel	Topics Discussed
Dec 24nd 2006	Mr. Dipak Timalsena (MIS Director) and IT support Staff	Soham Dhakal	Current IT Status ICT Master Plan
Dec 25th 2006	Mr. Dipak Timalsena Mr. Rajeev Shakya (Network Admin)	Soham Dhakal Sushil Sharma	Network Tour Hardware Infrastructure
1st Jan 2007	Interaction Meeting at Patan Appellate Court Mr. Jivan Adhikary (Registrar) and 3 other officers	Soham Dhakal	Status of IT at Patan Appellate Court
4nd Jan	Dr. Ram Krishna Timalsena (Registrar)	Soham Dhakal	Overall ICT vision and Goal. Issues in the current System
5th Jan	Kathmandu District Court Meeting	Sushil Sharma	Current Status of deployment and IT status
8th Jan	Mr. Til Prasad Shrestha (Join Registrar) and all other department heads	Soham Dhakal Sushil Sharma	Functional Assessment, Training Assessment , Software Assessment
14th Feb	Mr. Ishwor P. Parajuli (IT Legal Advisor)	Soham Dhakal	Functions of LIC, usage and goals.
15th Feb	Mr. Kisan Shrestha (Software Engineer)	Soham Dhakal	LIC, Database and Software Development Process
21st Feb	Mr. Dipak Timalsena	Soham Dhakal	ICT Master Plan
9th Apr	Mr. Binesh Dhungana	Soham Dhakal	Patan District Court

6.4 ANNEX D. REFERENCES

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