Chapter 1
Introduction to e-Government and its Scenario in Nepal

Definition of e-Government and Global Practices

e-Government (short for electronic government) also known as e-Gov (Internet government, digital government, online government, or connected government) consists of the digital interactions between a government and citizens (G2C), government and businesses/Commerce (G2B), government and employees (G2E), and also between government and governments (G2G).

There are mainly three types of e-Government application: G2G, G2B, G2C

The world is rapidly transforming into one society driven by an outstanding increase in the amount of communication between civilizations. It has really become information driven society, in which information and communication technology is playing important and indispensable role. Keeping up with the 21st century, governments around the world are embracing Information Technology (IT). In every region of the globe- from developing countries to industrialized ones - central and local governments are putting critical information online, automating bulky processes and interacting electronically with their citizens. The arrival of new information and communication technologies
(ICTs) has significantly enhanced our capabilities to collect, process, and distribute information. Almost all developing countries regard ICTs as an important factor while preparing their national development plans. One area has received outstanding attention is the use of ICT in the quest of good governance, usually termed e-Governance.

2014 e-government rankings

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Source: http://unpan3.un.org/ Figure: 2
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Figure: 3

According to the United Nation survey for world e-Government leaders, the Republic of Korea stands on the top of the EGDI Ranking where as Nepal is at 165th position.

**e-Government and e-Governance**

e-Government and e-Governance can be defined as two very distinct terms. e-Governance is a broader topic that deals with the whole spectrum of the relationship and networks within government regarding the usage and application of ICTs. e-Government is actually a narrower discipline dealing with the development of online services to the citizen, more the e on any particular government service - such as e-Tax, e-Transportation or e-Health. e-Governance is a wider concept that defines and assesses the impacts technologies are having on the practice and administration of governments and the relationships between public servants and the wider society, such as dealings with the elected bodies or outside groups such as not for profits organizations, NGOs or private sector/corporate entities. e-Governance encompasses a series of necessary steps for government agencies to develop and administer to ensure successful implementation of e-Government services to the public at large.

There is a widespread curiosity among citizens about e-Government. The below Figure 4 explains what people think when they hear the term e-Government. E-government encompasses most of the below mentioned points where the picture try to explain the relation and benefits through e-Government to provide various kind of services to its people via public administration from bureaucracy to service provider.
Citizen needs for e-Governance

- Greater government accountability
- Easy to access information
- Convenient services
- Quick response to requests
- Fast delivery of services
- Data security and confidentiality
- Citizen centric government
Government’s goals through e-Governance

- Becoming more proactive
- Increase internal efficiency and service levels to constituents
- Greater transparency
- More service oriented
- Reduced operating expenses
- Change citizens view of their governments as bloated, wasteful, and unresponsive to their most pressing needs
- Developing new sources of growth and a way to reduce vulnerability
- Better public services and quality of life
- Electronic communication between government agencies
- Citizens can conduct important/frequent/complex -administrative procedures with government agencies electronically

<table>
<thead>
<tr>
<th>TRADITIONAL VS E-GOVERNMENT</th>
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<td>Use of Resources</td>
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<tr>
<td>Infrastructure</td>
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<td>Fragmented</td>
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<td>Cost of Service</td>
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<td>High</td>
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<td>Speed of Service</td>
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<td>Weeks/Days</td>
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<tr>
<td>Return on Investment</td>
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<td>Low</td>
</tr>
<tr>
<td>Transparency</td>
</tr>
<tr>
<td>Low</td>
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<tr>
<td>Participation</td>
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Figure: 5
The above points can be better summarized by the Figure 5. It compares e-Government with traditional government. Hence, from the above figure data e-Government results high efficiency of work in comparison to the traditional government method.
e-Government Implementation in Nepal

We are in the process of building “New Nepal”. “New Nepal” should not become only a popular slogan but really the “New Nepal” with all the positive values and aspirations of its citizens geared towards the peace and progress. There are many dimensions streamlined and drivers identified to make our “New Nepal” dreams come true. One of such dimensions is the reformation of the government. Governance and its service process should be well reengineered to fulfill the aspirations of its citizens. Information and Communication Technology (ICT) and its tools can help its effective and efficient transformation.

In regard to this, the government of Nepal has prepared e-Government Master Plan Consulting Report (eGMP) with the collaborative effort with the Korea IT Industry Promotion Agency (KIPA), which is an attempt to lay the ground work for e-Government transformation.

E-government Vision is ‘The Value Networking Nepal’ through:

• Citizen-centered service
• Transparent service
• Networked government
• Knowledge based society

E-government mission statement is:

Improve the quality of people’s life without any discrimination, transcending regional and racial differences, and realize socio-economic development by building a transparent government and providing value added quality services through ICT.

To realize the vision and mission, the consulting team worked out strategies and selected 33 projects in sectors comprising G2C, G2B, G2G and infrastructure. All the projects are vital for Nepal, but there is a limitation of time, budget, human resource and capability of implementing such projects. Thus, the priority was given by considering the availability of technologies, institutional readiness, emergency handling capacity as well as environmental impact. There were 8 projects chosen as priority projects which were building groupware systems for government, government portal, national identification, education, communication network, enterprise architecture, PKI and integrated data center.

Although there are some missing elements in the eGMP, it may led to the successful e-Government in Nepal. All plans are continuously evolve so that the eGMP should be evaluate and update. Establishing good coordination between government organizations to make seriously committed environment to help implement e-Gov successfully.

Ongoing e-government projects of Nepal Government

- National Portal
  - It is a government website that will act as the single window (one-stop-shop) for all government e-Services and electronic information of Nepal to be delivered to citizens (G2C), business (G2B) and government employees (G2E). Delivery of e-Services will enable increased citizen participation and attempt to create an open, transparent
environment through integration of different government information systems and services.

- Inland Revenue Department (e-VAT, e-PAN, e-Filing, e-TDS)
  - The IRD is responsible for the administration of Value Added Tax, Income Tax, and Excise Duty. All these taxes can now be entered online through the web application developed by IRD. This has made taxpayers job easier.

- Office of Company Registrar
  - Office of the Company Registrar (OCR) Nepal is online making it easier to start a business which was otherwise very cumbersome. One can apply for company registration online, reserve their unique company names and check intended company name is available, file company documents and much more. It is one of the important approaches by digitizing the government works. OCR’s e-Services started from 2069/07/24 (November 09, 2012) while many other e-Services were added only on February 7th, 2013 to OCR’s website.

- Department of Foreign Employment
  - All the information of Department of Foreign Employment is made public and put in the website. It has an online application to track the record of an foreign employee through their passport number and permit number.

- Machine Readable Passport
  - Department of Passport has been issuing Machine Readable Passports (MRPs) as per the guidelines of ICAO Machine Readable Travel Document. To effectively carry on this job, the Ministry of Foreign Affairs has awarded the contract to Oberthur Technologies of France, a globally renowned company in the field of smart card technology and associated services, which personalizes the Nepalese Machine Readable Passports to the Department of Passport.

- Government Accounting System (FCGO)
  - Financial Comptroller General Office (FCGO) is the main agency responsible for the Public Financial Management (PFM) system of Government of Nepal (GoN). IT based Government Accounting System (CGAS) has also been designed and is executed. This captures transactions and their accounting, book keeping, reporting in respect of expenditure, revenue, and retention money in these units.

- Personal Information System (MOGA) (pis.gov.np)
  - Ministry of General Administration, department of civil personnel records is now online with more features added soon. Currently Post Management Information System, Sheet roll Information System, Asset Related Information System, SMS System and Online Appointment system are live.

- Business Portal
  - The e-portal provides easy, one-stop-shop access to exhaustive information about licensing requirements for business activities in Nepal. Here, Nepali businesses, large and small, can
access detailed information on relevant business licenses and permits, including requirements, cost, application forms and contact details for relevant regulatory agencies.

➢ e- Procurement
  ◦ PPMO has developed an online portal for all the works related to public procurement. It has a portal [https://www.gepson.gov.np](https://www.gepson.gov.np) which gives a web interface for all services. E-procurement web portal of GEPSOON is designed to facilitate the bidder to submit their bids through e-submission. Proposed alternative for submission of bid through e-submission is used to increase transparency, non-discrimination, equality of access, and open competition. This site provides easy to use internet access for tender information, information on award of contracts and an alternate facility to submit bids through e-submission to all interested bidders as specified in the Instructions to Bidders.

➢ Public Service Commission
  ◦ Many processes of Public Service Commission are now going online. It includes online application, result viewing etc. For now a single vacancy has been open for online application as a pilot project. From the next year all the vacancies of public service commission has to be submitted online.

➢ Government Groupware
  ◦ The Groupware seeks to share information and to communicate in real-time. Also it seeks to store and manage distributed information efficiently and support cooperative work among workers. It provides a single platform for mail, chat, web conferencing and document management system.

**Upcoming e-Government Projects**

➢ e-Customs
  ◦ This service will soon provide a web based online system for all services related to customs.

➢ Vehicle Registration (G2C): Transfer of Ownership, Blue Book Renewal, smart card for blue book
  ◦ Department of Transport Management is soon going to launch smart card system for the current Blue Book. This will make all work related to vehicle registration easier. In the next phase current licenses are also going to be replaced by smart cards.

➢ National ID
  ◦ National ID project is aimed in providing a single identification smart card to all the citizens which will contain all information regarding the citizen.

➢ Land Reform Information Management System (DOLRM)
Department of Land Reform Management will soon launch a system which is aimed on digitizing all process related to land registration and transfer. It will also digitize all land registration certificate such that each user will have his own digital form of land registration certificate.

- **e-Passport**
  - e-Passport is aimed on digitizing the current passport system. All the information regarding citizen's passport will be available in the digitally via online application.

- **e-Visa**
  - e-Visa is aimed on digitizing the current visa system of Nepal Government.

**Emerging Challenges of e-Government**

Depending on a country's economic, social, and technological reality, before an e-government program can progress, it must overcome a series of challenges, such as:

- Low Internet penetration
- Infrastructure restrictions
- Digital Divide
- Concerns regarding privacy and security
- Limited number of qualified IT specialists
- Unavailability of Payment Gateway
- Lack of Digital Signature
- Lack of IT literacy among the citizens
The above Figure-5 shows different barriers for the implementation of e-Government in context of Nepal. As such, Policy Barrier, Technical Barrier and Socio-Cultural via Financial Barrier are the major factors affecting the proper implementation e-Government in Nepal.
Chapter 2
Role of National Information Technology Center in e-Government Implementation

National Information Technology Center (NITC) - An Introduction

The National Information Technology Center (NITC), was established in the year of 2002 in line with IT Policy 2000 with the vision of developing and promoting Information Technology Sector of Government of Nepal. Being an implementing agency for Government of Nepal, NITC acts as a focal point for implementation of Government e-Services, which includes but not limited to ICT development projects for e-Governance.

Objectives of NITC in brief:

- Make information technology accessible to the general public and increase employment through this means
- Build a knowledge-based society
- Establish knowledge-based industries
- Implementation of e-Governance in Nepal

NITC Functionalities

e-Government Implementation Hub

Use of e-Governance is to raise the quality of services delivered by governments to citizens and businesses. Most governments in the developed world have moved towards implementation of IT to deliver services to the citizens as well as better govern their internal programs. Today wide ranges of e-Governance projects are being implemented at different parts of the country including the projects designed to reduce digital divide in rural areas that have been ignored in the past.

e-Governance is a radical concept that covers wide range of IT enabled reforms. They are as follows:

- Prioritize the governments need to use IT and the Internet to provide services between government agencies, citizens, and business
- Improve the democratic values of the government process and administrations through more transparency, accountability, and involvement
- Make the internal operation of public administrations more efficient
- Change the mindset of the administration for successful implementation of e-Governance
- Create awareness of IT in the top bureaucracy
- Expand access of IT to the common people through establishment of self sustaining Tele-center in rural part of the country

Server co-location

NITC co-locates servers of different governmental organizations and agencies in Government Integrated Data Center (GIDC). There are large numbers of Nepal governmental organizations that have been hosting their servers in GIDC. The government organizations hosting their servers in GIDC are:
1. Office of the Prime Minister and Council of Ministers
2. Ministry of Federal Affairs and Local Development
3. Ministry of Foreign Affairs
4. Ministry of Physical Infrastructure and Transport
5. Ministry of Home Affairs
6. Ministry of Education
7. Ministry of Co-operatives and Poverty Alleviation
8. Ministry of Peace and Reconstruction
9. Office of Controller of Certification
10. Department of Passport
11. Public Procurement Monitoring Office
12. National Emergency Operation Centre
13. Office of Company Registrar
14. Department of Customs
15. Credit Information Bureau
16. Department of Foreign Employment
17. Nepal Stock Exchange Ltd.(NEPSE)
18. Financial Comptroller General Office (FCGO)
19. Election Commission of Nepal
20. Rastriya Banijya Bank Ltd.
21. Department Of Hydrology and Meteorology
22. Nepal Television
23. CDS and Clearing Limited
24. Department of Drugs
25. Kathmandu Metropolitan City Office
26. Lalitpur Sub-Metropolitan City
27. Pokhara Sub-Metropolitan City
28. Bhaktapur Municipality
29. Water and Energy Commission
30. Department of Survey
31. University Grand Commission
32. Department of Immigration
33. National Information Commission
34. National Planning Commission
35. Department of Labor
Network and Internet Service Provider

NITC has been providing high speed Internet to different governmental organizations, agencies and departments through optical fiber network inside the Singh durbar premises. Currently, NITC is providing Internet to more than 30 governmental organizations. It also administers and troubleshoots government high speed network infrastructure of Singh durbar premise and provide technical support to organizations inside the Singh durbar.

Following are the list of Agency who have taken Internet Service from NITC

1. Office of the Prime Minister and Council of Ministers
2. Ministry of Finance
3. Ministry of Defense
4. Ministry of Home Affairs
5. Ministry of Federal Affairs and Local Development
6. Ministry of Physical Infrastructure and Transport
7. Ministry of Education
8. Ministry of Peace and Reconstruction
9. Ministry of Foreign Affairs
10. Ministry of Commerce and Supplies
11. Ministry of Labor & Employment
12. Ministry of Information & Communication
13. Ministry of Law, Justice, Constituent Assembly & Parliamentary Affairs
14. Ministry of Land, Reform and Management
15. Ministry of Industry
16. Ministry of Science, Technology and Environment
17. Ministry of Energy
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<td>42.</td>
<td>B.P. Koirala Memorial Planetarium, Observatory and Science Museum Development Board</td>
</tr>
<tr>
<td>43.</td>
<td>Office of Controller of Certification</td>
</tr>
<tr>
<td>44.</td>
<td>Narayandal Gulma</td>
</tr>
<tr>
<td>45.</td>
<td>Singh durbar Police</td>
</tr>
<tr>
<td>46.</td>
<td>Civil Hospital</td>
</tr>
<tr>
<td>47.</td>
<td>Financial Comptroller General Office</td>
</tr>
<tr>
<td>48.</td>
<td>Tourism Board</td>
</tr>
<tr>
<td>49.</td>
<td>Peace Fund Secretariat</td>
</tr>
<tr>
<td>50.</td>
<td>Social Security Fund</td>
</tr>
</tbody>
</table>
GIDC (Government Integrated Data Center)

GIDC was established in the year 2009 and was the grant project from Korean government to Government of Nepal. Currently, GIDC is housing servers of Nepal government organizations, departments and agencies.

The objectives of GIDC are:

- Minimize investment cost by using GIDC based common facilities
- Improve stability and efficiency through concentrated central management within Data Center that provide Internet access and management for e-government
- Minimize operation cost by means of centralized GIDC
- Offer easy expansion and upgrade for increasing demands
- Offer basic environment for government co-location and integrated government mailing service

Disaster Recovery Center (DR)

DR Center is the exact replica of GIDC which is soon going to be established in Hetauda, Nepal. The MOU has already been signed and construction is about to being soon. It is also a grant project for Korean government to Government of Nepal. DR center works as a backup for GIDC.

National Portal and Business License e-Portal

National Portal

The Nepal government National Portal (nepal.gov.np) provides easy, one stop access to information and services of different Nepal governmental organizations.
The Above figure 7 is the Home page of Nepal Government e-Portal where anyone can acquire formal information regarding different sectors of Nepal like Tourism, Business, Citizens and various other factors including government plans and activities and its people.

**Business license Portal**

The Nepal Business e-portal (licenseportal.gov.np) provides easy, one-stop access to exhaustive information about licensing requirements for business activities in Nepal. Here, Nepali businesses, large and small, can access detailed information on relevant business licenses and permits, including requirements, cost, application forms and contact details for relevant regulatory agencies. This license portal is part of a broader set of initiatives undertaken by the Government of Nepal to improve the investment climate.
The Figure 8 is the landing page of Nepal Business License e-Portal where all the necessary information regarding business example, government policies and rules can be found in this portal.

The technical support for both of these systems is administered by NITC.

e-Services (Domain Registration, Web Hosting, Email)

NITC has been providing domain registration, webhosting and email services to Nepal government organizations. Till date, NITC has registered following number of domains, websites and emails.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Services</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Domain Registered</td>
<td>969</td>
</tr>
<tr>
<td>2</td>
<td>Webhosting</td>
<td>508</td>
</tr>
<tr>
<td>3</td>
<td>Emails provided</td>
<td>95</td>
</tr>
</tbody>
</table>

Figure: 9
Singhdurbar e-Gate Pass System

NITC has been providing e-Gate pass system for general people to enter Singhdurbar premise quickly and easily. NITC provides e-Gate pass admin account to offices inside Singhdurbar and the corresponding office issues the gate pass of their visitors through Singhdurbar e-Gate pass system. Currently 44 offices and departments inside Singhdurbar are using the e-Gate pass system. Below three figures are the snapshots of Singhadurbar Gatepass System.

Figure: 10

Figure: 11
Human Resource Development

National Information Technology Center (NITC) is the main implementing body of e-Government in Nepal. Developing human resource in the field of IT is the first & foremost need to implement e-Government. It is difficult to implement e-Government without IT literate human resource. To empower the ICT literacy NITC has been conducting Basic, Advance and Expert level computer training course along with ICT awareness training programs and workshops inside and outside the Kathmandu valley. NITC has already trained more 2350 people from different government agencies and NGOs.

Consultancy and Advisory Service

NITC provides consultancy and advisory service about ICT to all the Government organizations and departments within the country.

Research and Development:

NITC conducts research and development work relating to ICT for the development of ICT sector in Nepal.
**Tele-Center**

The approach to Tele-center was instigated in order to shrink the Digital Divide that evolved from the situation in which substantial number of citizen in the developing country lack to obtain the rights of developmental progress. In general, through the concept of Tele-center, it is aimed to provide the deficit community with the ease of modern Information Technological services such as internet, email, fax, photocopy, scan etc in order to help them reach the realm of development.

Establishment of Tele-center helps to reduce the Information and knowledge poverty, consequent trivial boundary relation in developmental effort to showcase major changes in modern Information and Communication sector. At present, it is strongly felt that with the establishment of Tele-center, developmental methodology based on Information and Communication technology should also go hand in hand.

Tele-centers can also be used in local level to be integrated with government services. The local level employees can be trained to use e-government services such as land registration, tax records etc.

**Activities of NITC:**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Services</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Number of Domain Registered</td>
<td>969</td>
</tr>
<tr>
<td>2.</td>
<td>Total Number of Website Hosted</td>
<td>508</td>
</tr>
<tr>
<td>3.</td>
<td>Email Service Provided to No. of Government Agencies</td>
<td>95</td>
</tr>
<tr>
<td>4.</td>
<td>Internet Service Provided to No. of Government Agencies</td>
<td>52</td>
</tr>
<tr>
<td>5.</td>
<td>No. of Government Agencies Server Co-located</td>
<td>47</td>
</tr>
<tr>
<td>6.</td>
<td>E-gate Pass System Provided to No. of Government Agencies</td>
<td>47</td>
</tr>
<tr>
<td>7.</td>
<td>Number of Government Employees Trained</td>
<td>2350</td>
</tr>
</tbody>
</table>
Chapter 3
Government Integrated Data Center (GIDC)

GIDC – an Introduction
It's an National Data Center for Nepal for the first time in the whole history of ours, built with the help of the KOICA, Korean Government. The name given for this Data Center is Government Integrated Data Center (GIDC). Investment of 23 corer had been made for this project. This project was started on 14th May, 2008.

Figure: 14 NITC Building

It has mainly three types of Data Centers:

- Internet Data Center (IDC)
- Storage Data Network (SDN)
- Enterprise Data Center (EDC).

1. IDC: It provides data and Internet services for other companies. It consists of 16 Terabyte storage and 10 Terabyte as a backup for keeping the data of government and the other organizations.

2. SDN: It is a network of interconnected storage devices and data servers usually located within an enterprise data center or as an off-site facility offering leased storage space.

3. EDC: This is the central processing facility for an enterprise’s computer network.
The below figure explains different phases of development for the implementation and operation of GIDC.

![Government Integrated Data Center (GIDC)](image)

The concept of GIDC was provisioned in the national e-Governance Master Plan (eGMP) by the Government of Korea through KOICA assisted construction of GIDC.

The construction of GIDC was completed and handed over to NITC in May 2009.

High end computing infrastructure with multi-tier security.

Works as a base infrastructure to host e-Gov. applications.

Improve stability and efficiency through concentrated central management within Data Center that provide Internet access and management for e-government.

---

The above figure 15 shows the relation between GIDC and NITC with additional information like Human Resource, System, Infrastructure and a service provider to different government agencies.

**Features of GIDC**

- High End Computing Infrastructure
- Storage Area Network (SAN)
- High Speed Local Area Network
- Multi-Tier Security
- High Speed Internet Connectivity
- 24*7*365 Help Desk
- Multi level redundant power back-up
- Air Conditioning Management
- Fire Detection & Control System

**Objectives of GIDC**

- Minimize investment cost by using GIDC based common facilities
- Improve stability and efficiency through concentrated central management within Data Center that provide Internet access and management for e-government
- Minimize operation cost by means of centralized GIDC
- Offer easy expansion and upgrade for increasing demands
- Offer basic environment for government co-location and integrated government mailing service
Facilities of GIDC

Information Technology System:
- Routers, Backbone Switches etc.
- Integrated Network Management System
- Integrated Server Management System
- Integrated Storage
- Integrated Back-up
- High level firewall with security for different attacks and threats

Infrastructure System:
- Air-Circulation System: HVAC (Heating, Ventilating, and Air Conditioning)
- Main Monitoring Room: Integrated Console
- Facility Management System: Water Leakage Sensing
- Disaster Prevention System: Fire-Fighting

Electrical System:
- Auto Load Transfer Switch
- Main Power Switchboard (3 Transformers)
- Emergency Generator: 400 KW
- U.P.S. - 200KVA
- Batteries: 480 nos.

Security Features
To guard against line failure or intrusion, the data center is staffed 24 hours a day. Movement throughout the facility is escorted at ALL times. There is 24x7 closed circuit monitoring of all areas and entrances. Between the cameras, access control, and the security team, the datacenter facilities are pretty secure. Along with the physical security there is multi layered logical security system to prevent any data loss. There are high level firewall devices to limit access to different services and logging devices to keep track of everything that is happening inside the system.

The Figure 16 shows the different levels of logical security for the protection of data inside NITC. There are seven layers of Security Services provided by NITC including firewall and anti spam security. These layers provide complete content protection along with integrated management, logging & reporting.

Figure: 16
Chapter 4

Government Enterprise Architecture (GEA)

Introduction

Government Enterprise architecture (GEA) is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the company's operating model. The operating model is the desired state of business process integration and business process standardization for delivering goods and services to customers.

- GEA provides foundation framework to enable Government of Nepal effectively deliver services across all service delivery channels to citizens (G2C), business (G2B) and other government units (G2G) and G2E.
- Presents a platform for connected government defining principles, standards and guidelines
- Enables information sharing across ministries / departments / divisions / Agencies
- Enhances ability to deliver effective and timely services
- Improves operational efficiencies
- Better service delivery models
- GEA will provide the foundation to enable the Government of Nepal to effectively deliver services across all service delivery channels to citizens, business and other government units

Objectives of GEA

- It has been envisioned to deliver a common integrated interoperability platform or service delivery gateway for information exchange and host the national portal of Nepal that will act as the single window (one-stop-shop) for all government e-Services and electronic information of Nepal to be delivered to citizens (G2C), business (G2B) and government employees (G2E).

- Delivery of e-Services will enable increased citizen participation and attempt to create an open, transparent environment through integration of different government information systems and services.
Model:

The below figure shows, the basic framework of GEA regarding the interaction between service providers, access provider and service seekers.

Figure: 17
Chapter 5
Government Interoperability Framework (GIF)

Definition

e-Governance interoperability, in its broad sense, is the ability of constituencies to work together. At a technical level, it is the ability of two or more government information and communications technology (ICT) systems or components to exchange information and to use the information that has been exchanged to improve governance.

eGIF provides a framework to the government to share, collaborate and integrate information and organization processes by use of common standards.

- Conceptual framework for interoperability, technical standards and data standards to ensure that the technology and data from ICT system of one Ministry / Department / Agency (MDA) will be compatible and interoperable with ICT system of another MDA.
- It provides the knowledge of how to achieve interoperability of data and information within and outside the government.
- However technical standards in NeGIF alone cannot ensure interoperability. Each organization's process, collaborative environment, common applications, development of semantics are other key factors to ensure interoperability

e-GIF ARCHITECTURE

The figure shown below describes the architecture as well as the standards that need to be maintained for an e-GIF architecture.

Figure: 18
Applicability of e-GIF

✓ Federal Government Ministries and Departments
✓ The office of the President and all its Departments.
✓ All provincial Government Ministries and all their subordinate offices and departments.
✓ All offices of the Provincial Governors and its subordinate offices
✓ All government operated autonomous institutions.
✓ All local government entities and organs
✓ All privately owned businesses and private entities that act as subcontractors for the government must follow e-GIF in their upside links with the government owned systems.

e-GIF Major Policies

✓ Adoption of Open and Free standards
  • Reduction of Risk
  • Durability
  • Flexibility and interoperability
  • Better Vendor Support:
  • Lower Costs and Better ROI:
  • International Standards
✓ Internet and world wide web
✓ Extensible Markup Language (XML)
✓ Content and Document Management
✓ Delivery Channels
✓ Users with disabilities
✓ Information Security
✓ Maximize Participation
Figure 19 shows the e-GIF implementation framework. The implementation focuses in different group as shown by the figure.
The e-GIF management process consists of continuous redrafting and review before the acceptance and release to the users. A proper change control mechanism is used for modifications and all the changes are properly reviewed.
Chapter 6

National Portal

Introduction to National Portal

The Nepal government National Portal (nepal.gov.np) provides easy, one stop access to information and services of different Nepal governmental organizations. It is used as a store for the delivery of Govt. G2C, G2B & G2E eServices. eService Seekers typically citizens, business, government employee & tele-center users can avail these service by logging into the national portal and filling & submitting the service request forms online.

The National eService Delivery Gateway & National Portal of Nepal will serve as the Service Access Provider that will provides the infrastructure to facilitate government service access by the Service Seekers. Linked to the Service Access Providers will be the delivery channels, which would be the access mechanism for the citizens and businesses to avail the e-Governance services.

Portal characteristics

- Single, powerful search
- Fast and powerful
- Integration of diverse content (public web, licensed journals, digitized materials, news feeds, etc.)
- Searches across formats and record syntaxes
- Searches may be more specific with the range of options (subject, format, date)
- Content may be searched by subject

National Portal –Features

- Dissemination of relevant Information to targeted Customers
  - Information on the Country
  - National policies
  - e-Gov, GEA and NeGIF standards and guidelines
  - Specific Information of the departments
  - Right to Information
  - Multiple languages

- Online access/payment of various government services and utility bills not yet implemented till now
- Link to external / government department websites
- Collaboration services
Significances:

- Single Window for delivering content, services
- Build the brand of Nepal
- Reduction of administrative burden
- Citizen Relationship & Transparency
- Support and align to e-Governance initiatives
- Service Delivery Channel (G2C/G2G/G2B)

National Portal – Critical Success Factors

- Enable the backend computerization of various departments
- Achieve a common service delivery platform
- Greater involvement with different entities
- Arrive at a baseline for future design and implementation of the same
- Refreshing the portal data (avoid staleness)
- Authorized persons need to be assigned by the Department to maintain the Content Management System
- Frequent training for Government officials

Portal has two main components

- Contents
  - Contents from different agencies are collected and placed in National Portal
  - In future all agencies will be responsible to update contents
- e-Services
  - 41 different services from 16 agencies has been identified during initial survey with different stakeholders e.g. citizens, business people, politicians
  - IRD services has been integrated as pilot services

Objectives of National Portal:

- Global Presence:
  - It is face of the government to the entire world and can be accessed from any part of the world.
- Citizen Relationship:
  - Citizens do not have to physically be at government offices to interact or get government services.
- Integrated Services Delivery Channel:
  - Provides G2C, B2B, G2G and G2E services and reduces administrative burden on employee
  - Cater to government of Nepal’s long term strategy
- 24 *7 Service
  - Can be accessed anytime irrespective of office time and holiday
Networked Government

Vision and mission of Nepal e-governance policy

Portals versus Websites

Portals and websites are distinct entities which often overlap and complement each other. A web portal and website should be strongly linked together, but they should not replace each other. Website represent an organization to outside world, portal provides multiple user roles with a common access point.

A website is also a portal, if it broadcast information from different independent resources, thus offering a public service function to visitors.

Web Portal:
Web portal refers to a website or service that offers broad array of resources and service such as email, forums, search engines, etc. It's an organized gateway that helps to configure the access to information found on the internet. Web portal applications offers consistent look and feel with access control and procedures for multiple applications and databases.

Websites
A website refers to a location on the internet and a collection of web pages, images, videos which are addressed relative to a common Uniform Resource Location (URL). Its nothing but a domain name hosted on a server which is accessible via a network.

Overall:
- Portals do not replace Websites
- External users still need access to your home page
- Portals are designed to be access points to specific information and places
- Portals work well in intranets and extranets
Figure: 21: Nepal Government web-portal
The national portal of Nepal Government is shown in the above figure. It provides a single gateway to all services of Nepal Government.
Chapter 7

Government Groupware

Definition

Groupware may be defined as software that provide functions and services that support the collaborative activities (writing and commenting on group projects, sharing ideas and documents, conducting electronic meetings, tracking and status of tasks and projects, scheduling, and sending email) of work groups.

The term "groupware" refers to specialized software applications that enable group members to share and sync information and also communicate with each other more easily. A class of software that helps group of colleagues (workgroups) attached to a local-area network organizes their activities.

Scope of Government Groupware project

- Scheduling meetings
- Centralized e-Mail
- Instant Messaging
- Document Management System
- Web Conferencing
- Video Conferencing
- e-Tippani System

e-Tippani System : This features digitizes the tipanni system of Nepal Government. The users will get their role based privileges to write and comment in a tippani. All the tippani will reach the concerned authority digitally through an application and each of them can input their views and comments as per their role.

Video Conferencing : This feature allows a live connection between multiple government authorities in separate locations for the purpose of communication, usually involving audio and often text as well as video.

Web Conferencing : This feature allows a real-time collaboration in which multiple computer Government users, all connected to the Internet, see the same screen at all times in their Web browsers.

Document Management System : This feature allows users to track, manage and store digital documents.

Scheduling meetings : This feature allows government officials to schedule meetings/web meetings among each other through a secured government network.
Centralized e-Mail: This feature allows all government officials to have a single email username although being transferred to multiple government agencies.

Instant Messaging: This feature allows all the government officials to communicate/chat with each other through a secure government application. This is like a messenger service provided by different private companies like Yahoo, MSN, etc.

Benefits of Government Groupware

Groupware can allow both geographically dispersed team members and a company's on-site workers to collaborate with each other through the use of computer networking technologies (i.e., via the Internet or over an internal network/intranet). As such, groupware is especially important for remote workers and professionals on the go, since they can collaborate with other team members virtually.

Features of Government Groupware

- Some common features provided in groupware solutions include:
  - A centralized repository for documents and files that users can access and save
  - Document version management and change management
  - Shared calendars and task management
  - Web conferencing, instant messaging, message boards, and/or whiteboard
Chapter 8
Other e-Government Applications

Business License e-Portal

- A single platform which provides detail information about business licenses required for starting and running a business.
- The ‘Search’ facility allows the user to search by keyword, licensing agency, business type, or industry.
- Available in Nepali and English, it is freely accessible to members of the business community, individuals and organizations through the internet.
- Contains a comprehensive inventory of 130 licenses and related information on approvals for starting and operating businesses.
- Through the e-portal, entrepreneurs will now have access to authentic information through one website, helping them prepare applications without having to visit different issuing agencies.
- The below figures re snapshots of Nepal Business License e-Portal.

![Image of Nepal Business License e-Portal]

Figure: 22
The license portal is available in both English and Nepali language.

License portal provides search based on different options like organization to provide license, type of business, law guiding the license and etc.
Introduction to Company Registration System (OCR):

CRO has introduced an online company registration system where users can register a new company, change company profile, check for valid company name through online web service. This has helped CRO to digitize most of its work. The system can be accessed through the following URL: https://www.ocr.gov.np/CRO

Figure: 25: Website of Company Registration Office

The figures show the home page of the website of company registration office.
Users can sign in with their username and password to access and change all the information about their company. The above interface provides all the details on the ways to register a new company and to get the username and password of an already registered company.

Features:
- Reserve company name online
- Post all document online for new company
**e- Value Added Tax returns:**

**Introduction**

There is a persistent increase in the number of VAT registrants. It has crossed the 40,000 mark. At the time of conversion from the then existing sales tax to VAT, a total of 2045 taxpayers were converted as VAT registrants. As the taxpayers are increasing, the amount of revenue collection and the level of tax compliance is improving today. e-VAT RETURNS is an Internet based system. This allows to insert online Returns information. Effort has been made to simplify the system so that the system can be operated without any training.

**How to use e-VAT returns**

- First take username and Password from IRD office.
- Go to ird.gov.np
- Click on Taxpayer Portal under Online services
- Go to e-VAT Return

![Figure: 27: User login screen of e-VAT system](image)

- Then go to VAT Return Login
- After login enter VAT detail with reference to sales, purse book detail.
- Then submit the data
- After that verify the entry data with previous month credit amount.
- Then deposit the tax in bank
e-Permanent Account Number (e-PAN)

e-PAN is an Internet based system. This allows to insert online PAN information. Effort has been made to simplify the system so that the system can be operated without any training.

Personal Account Number System (e-PAN System):

e-PAN is an Internet based system. This allows access to any tax payers and tax officers from any where. Effort has been made to simplify the system so that the system can be operated without any training. Only requirement will be access to Internet and skill to operate Internet. Following steps will clarify processes of the system.

Accessing e-PAN:

Figure: 28: Landing page of e-PAN system

How to register e-PAN?

Submit required document in IRD office with application creation username and password

Accessing e-PAN:

Access to e-PAN is from the official website of Inland Revenue Department which is www.ird.gov.np. In the top menu there is a menu item that reads e-PAN System. By clicking the link user will be directed to PAN System site.

Getting Submission Number:

First step to enter PAN registration information by the taxpayer is to book a submission number. To do
this, users have to click ‘Get Submission Number’ menu in the top. System will then ask user to enter the following

1. User name
2. Password
3. Reconfirmation of password,
4. Pan type(Individual, business or Proprietary Business)
5. Pan for(either income tax only or Income tax and Vat both)
6. Name of the taxpayer entity,
7. Registration date(date from which taxpayer wishes to register for pan) and

Figure: 29: Get Submission Number page of e-PAN system
Confirmation:

Figure: 30: Confirmation Page for Submission Number, Username and Password.

After entering these information and submitting the information system will assign a unique number (eg, 6200000123) and display it to the user. User must remember user name, password and this submission number to enter, modify and submit the records. User can proceed to enter PAN records from this step itself or enter PAN records later.
Personnel Information System (PIS)

Introduction

Personnel Information System (PIS) is a computerized database application that maintains and manages all the demographic and service profile of a civil servant. Simply, the application is an electronic format of the “Sheet Roll” that every civil servant must fill up during his/her first appointment. The PIS maintains the vital information of an employee such as Sheet Roll Number, name, date of birth, gender, father’s and grandfather’s name, nominee, permanent address, PF number, CIT number. Similarly, the system also keeps track of all the service events of an employee during his career within the civil service such as appointments, transfers, promotions, placements, educational background, awards, training details, medical allowances, disciplinary actions. With such feature rich application, the system maintains the complete organizational structure of the Government of Nepal and is classified by various service groups, posts and positions. In addition, is able to generate the entire payroll details (Talabi Pratibyaden) for an employee based on his/her PIS data.

What are its major features and functionalities?

- Keeps track of an entire service history of an employee
- Maintains Organizational structure of the Government classified by various service groups, posts and positions
- Maintains a complete sanctioned posts and positions of GoN (Darbandi)
- Gender based information
- Vacancy and retirement forecasting
- Employees complete demographic profile
- Sanctioned versus Occupied posts within the Ministry/Department/office
- Automatically calculates and generates payroll (Talabi Pratibyadan)
- Automatically generates letters of Appointments, transfers, promotions, retirements, placements, pension & gratuity authorization letters
- Ability to customize letters template
- Calculates Pension and Gratuity amount based upon PIS data along with the Government rules and regulations
- Ability to export PIS data to MS Excel
- Ability to build your own customized query and generate specific results
- Maintains a complete audit trail of every transaction made
- Highly secured, reliable and easy to use features
- Online help and discussion forum
Login Details:

Figure: 31: Login page of e-PIS

The above figure shows the login interface of the PIS system. All the data of a government employee could be accessed after logging in to the system.
Using this application citizens can apply for different government job vacancies online. All the data entered by the citizens are saved in the server such that user can reuse the same data to apply for different vacancies. This application can also be used to store results of different vacancies and question paper for different vacancies.

Figure: 32: Login page of Public Service Recruitment Management System
Chapter 9
Nepali Unicode Software

Introduction

Fundamentally, computers just deal with numbers. They store letters and other characters by assigning a number for each one. Before Unicode was invented, there were hundreds of different encoding systems for assigning these numbers. No single encoding could contain enough characters: for example, the European Union alone requires several different encodings to cover all its languages. Even for a single language like English no single encoding was adequate for all the letters, punctuation, and technical symbols in common use. Any given computer (especially servers) needs to support many different encodings; yet whenever data is passed between different encodings or platforms, that data always runs the risk of corruption.

Unicode provides a unique number for every character used in the computer, no matter what the platform, no matter what the program, no matter what the language. This completely minimizes the conflicts and data corruption caused by the incompatible coding system. With the system globally compatible for any data processing and encoding system the Unicode Standard has been adopted by such industry leaders as Apple, HP, IBM, Just System, Microsoft, Oracle, SAP, Sun, Sybase, Unisys and many others. Unicode is required by modern standards such as XML, Java, ECMA Script (JavaScript), LDAP, CORBA 3.0, WML, etc., and is the official way to implement ISO/IEC 10646. It is supported in many operating systems, all modern browsers, and many other products. The emergence of the Unicode Standard and the availability of tools supporting it are among the most significant recent global software technology trends.

Incorporating Unicode into client-server or multi-tiered applications and websites offers significant cost savings over the use of legacy character sets. Unicode enables a single software product or a single website to be targeted across multiple platforms, languages and countries without re-engineering. It allows data to be transported through many different systems without risk of data being corrupted.

How Does it Help Nepali Computing?

Up to now, various locally developed unauthorized Nepali fonts such as Himali, Preeti, Kantipur, Sama etc. has been developed and used to fulfill the need of documents required in Nepali language. All these fonts though use the Devnagari font as their base, have different coding system. This brings about a lot of complication in downloading the documents from one pc to other, especially when the document prepared in a particular font doesn’t get downloaded in the other computer in the absence of the same font in the latter one.

To view the document, the exact font had to be installed in the receiving computer. Sometimes even a single page of document may contain several kinds of fonts which make the downloading process even more complicated and time consuming. But with the Unicode Devnagari font installed in the keyboard, this problem is completely minimized. The Unicode Devnagari font can be downloaded in any
computer in any part of the globe provided that has Windows 2000 or XP installed in it.

**Characteristics of Unicode**

- Easy to type, Generally type as a pronunciation
- Not to worry about Alt+ 000 and etc…
- Facility of Traditional as well as Romanized Typing
- Letters are free
- Not to worry about Font Problem
- Cannot write out of Rule
- Easy sorting (Ascending/Descending) according to number or word (By Alphabetically)
- Can create Database in Nepali Language
- Easy in case of Mailing or Chatting

**Advantages of Unicode**

- Simple and pure writing
- Scientific Computer Work
- Time Saving due to Romanized Typing and not Tedious
- Making Nepali Language as International Standard

**Types of Fonts**

There are two types of Fonts in Nepal Unicode. These are:

1. Mangal (Old Version)
2. Kalimati (New Version)

Some minor changes have been made in the upgraded Nepali Unicode Keyboard Layouts. These changes are demonstrated with explanations below.
Nepali Romanized Keyboard Layout

Changes or Updates in the Traditional Keyboard Unicode Layout

The '+' key in your keyboard is used as a Zero Width Non-Joining character while '=' key work as a Zero Width Joining character.

Zero Width Non Joiner (ZWNJ) is typically used to represent the separated form of characters that normally fuse together to form a ligature. In the context of Nepali, the halanta representation has an implicit behavior similar to zero-width joiner. The ZWJ following the consonant+halant sequence (‘ka’+ halant in the example) represents the half-consonant form of the syllable (‘ka’ in the above example). The ZWNJ, on the other hand, is used in representing the split or separated form of the conjunct. When neither the ZWJ nor the ZWNJ appears following the halant character, the conjunct is shown in the customary full ligature form.
Installation

Nepali Language Input in Windows 7

After the completely installation of Nepali Unicode Software following instruction should be followed:

1. The steps are written based on Windows 7 Ultimate edition, and should work for all other editions.
2. Go to the Control Panel >> Region and Language Settings
3. On Region and Language wizard select Keyboards and Languages tab.
4. To change your keyboard or input language to Nepali, click Change Keyboards, you should see the following Text Services and Input Languages screen.
5. Click Add to install Nepali Language in Windows 7. (check on the Default input language drop down menu if it has been already enabled)
6. Now, on Add Input Language box select Nepali (Nepal) >> Keyboard Nepali, and Click OK.
7. Now you shall be taken to Text Services and Input Languages screen again where you should apply the settings. Click OK and you are ready with Nepali (Nepal) Keyboard in Windows 7.

To get started with Nepali Keyboard, select the NE (Nepali – Nepal) from the Language bar near the hidden icons or Action Centers at right corner of the Taskbar as illustrated.

To interchange the Languages (Nepali and English), Please press Alt+Shift key and start to type.
Chapter 10

Information Security

Information Security – an Introduction

What is Information Security?

Information security, sometimes shortened to InfoSec, is the practice of defending information from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction.

Information security is the process of protecting the availability, privacy, and integrity of data. While the term often describes measures and methods of increasing computer security, it also refers to the protection of any type of important data, such as personal diaries or the classified plot details of an upcoming book. No security system is foolproof, but taking basic and practical steps to protect data is critical for good information security.

Importance of Security

Information security is important for every company within all areas of business – hardly any company today can deny the importance of keeping their information secure. Having an information security management system (ISMS) shows that your organization manages its information properly and systematically thus keeping your information correct, easily accessible and well protected.

An information security management system (ISMS) is a set of policies concerned with information security management or IT related risks.

The governing principle behind ISMS is that an organization should design, implement and maintain a coherent set of policies, processes and systems to manage risks to its information assets, thus ensuring acceptable levels of information security risk.

Headline news about stolen and missing data is becoming a frequent occurrence nowadays. In today’s high-tech technology environment, organizations are becoming more and more dependent on their information systems. The public is increasingly concerned about the proper use of information, particularly personal data. The threats to information system from criminals and terrorists are increasing.

The internet allows an attacker to attack from anywhere on the planet.

Risks caused by poor security knowledge and practice:

- Identity Theft
- Monetary Theft
- Legal Ramifications (for yourself and companies)
- Termination if company policies are not followed
Many organizations identify information an area of their operation that needs to be protected as a part of their system of internal control. It is vital to be worried about information security because much of the values of e-Government services are concentrated in the value of information.

As we have already discussed that Nepal is in the infancy stage of e-Government services, if security is breached at this stage, people of Nepal having very less IT literacy rate will be reluctant in using these services which may result in failure of such e-Government services.

Security Service gap for E-government Services

Figure 35 shows trend of development of e-Government services and Security services. As from 1990 till 2010 the gap between the Security services curve and e-Government service curve is growing continuously. This gap means that although e-Government services are growing rapidly whereas security services are not growing at that rate. The increase in this gap shows that the e-Government services are vulnerable to threats as the development of security is lagging behind. We should be more focused to shorten this gap to make the e-Government services more reliable and secure.

The gap in the above curve has given rise to computer criminals creating a huge threat to our digital information. The figure no. 37 below shows different computer criminal activities.
Leading Threats

- Virus
- Worm
- Torjan Horse
- Social Engineering
- Rootkits
- Botnets/Zombies

Figure: 36

Figure: 37 : Pictorial representation of different computer threats
**Virus**

- A virus attaches itself to a program, file, or disk
- interferes with operation, and to copy, corrupt or delete your data
- When the program is executed, the virus activates and replicates itself
- The virus may be benign or malignant
  - Viruses result in crashing of computers and loss of data
- In order to recover/prevent virus/attacks:
  - Avoid potentially unreliable websites/emails
  - System Restore
  - Re-install operating system
  - Anti-virus (i.e. Avira, AVG, Norton)

**Worm**

In a computer, a worm is a self-replicating virus that does not alter files but resides in active memory and duplicates itself.

- More sophisticated than viruses
- Independent program which replicates itself and sends copies from computer to computer across network connections.
- Upon arrival the worm may be activated to replicate.

---

**Figure: 38**

**Program A**

<table>
<thead>
<tr>
<th>Extra Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infect</td>
</tr>
</tbody>
</table>

**Program B**

---

**Figure: 39: Different ways of getting worm**

Removable devices, such as External Hard Drives and USB sticks, may get infected by the worm.

Computers with open shares may get infected by the worm.

Computers without the latest security updates may get infected by the worm.

Computers with a proper password policy, current security updates, antivirus or security software, and secured shares are protected from infection of the worm.

Worm/Win32/Conficker attempts to make numerous connections to computers across the network, seeking systems that do not have current security updates, or have open shares, removable media, or weak passwords.
Torjan Horse

- Trojan horse program which seems to be doing one thing, but is actually doing another
- Sets up back door in a computer system for intruder to gain access later
- Download a game: Might be fun but has hidden part that emails your password file without you knowledge.

Social Engineering

Social engineering manipulates people into performing actions or exposing confidential information. Similar to a confidence trick or simple fraud, the term applies to the use of deception to gain information, commit fraud, or access computer systems.
Phishing = Fake Email

Phishing: a trustworthy entity asks via email for sensitive information such as SSN, credit card numbers, login IDs or passwords.

Figure: 42: Example of phising

Pharming = Fake Web Pages

Dear valued customer of TrustedBank,

We have recieved notice that you have recently attempted to withdraw the following amount from your checking account while in another country: $135.25.

If this information is not correct, someone unknown may have access to your account. As a safety measure, please visit our website via the link below to verify your personal information:

http://www.trustedbank.com/general/custverifyinfo.asp

Once you have done this, our fraud department will work to resolve this discrepency. We are happy you have chosen us to do business with.

Thank you,

TrustedBank

Figure: 43 :Examples of pharming
The link provided in the e-mail leads to a fake webpage which collects important information and submits it to the owner.

- The fake web page looks like the real thing
- Extracts account information

**Botnet**

- A botnet is a large number of compromised computers that are used to create and send spam or viruses or flood a network with messages as a denial of service attack.
- The compromised computers are called zombies

![Figure: 44: How attacker works](image)
Man in the Middle Attack

An attacker pretends to be your final destination on the network. If a person tries to connect to a specific WLAN access point or web server, an attacker can mislead him to his computer, pretending to be that access point or server.

![Diagram of a Man in the Middle Attack](45.png)

Figure: 45 : How attacker works

Rootkit

- Upon penetrating a computer, a hacker installs a collection of programs, called a rootkit.
- May enable:
  - Easy access for the hacker (and others)
  - Keystroke logger
- Eliminates evidence of break-in
- Modifies the operating system

![Graphical representation of a rootkit](46.png)

Figure: 46 : Graphical representation of rootkit
Recognizing a Break-In or Compromise

Symptoms:

- Antivirus software detects a problem
- Pop-ups suddenly appear (may sell security software)
- Disk space disappears
- Files or transactions appear that should not be there
- System slows down to a crawl
- Unusual messages, sounds, or displays on your monitor
- Your mouse moves by itself
- Your computer shuts down and powers off by itself
- Often not recognized

Current Scenario in Information Security

Consumers are bombarded with media reports narrating dangers of the online world.

Some of the news regarding worldwide information thefts is given below.

Probe Targets Archives’ Handling of Data on 70 Million Vets

The inspector general of the National Archives and Records Administration is investigating a potential data breach affecting tens of millions of records about U.S. military veterans

JPMorgan Chase Hacking Affects 76 Million Households

A cyber attack this summer on JPMorgan Chase compromised the accounts of 76 million households and seven million small businesses, a tally that dwarfs previous estimates by the bank and puts the intrusion among the largest ever.

Banks: Credit Card Breach at Home Depot

Multiple banks say they are seeing evidence that Home Depot stores may be the source of a massive new batch of stolen credit and debit cards that went on sale this morning in the cybercrime underground. Home Depot says that it is working with banks and law enforcement agencies to investigate reports of suspicious activity.

Hackers hit companies like Nasdaq, 7-Eleven for $300 million

Over seven years, five Russians and a Ukrainian used sophisticated hacking techniques to steal more than 160 million credit and debit card numbers, target more than 800,000 bank accounts and penetrate servers used by the Nasdaq stock exchange.

UDID leak source ID’d: BlueToad mobile firm says it was hacked
A small mobile publishing company said today that it was the source of the large number of unique Apple device IDs leaked to the Internet last week.

Blue Toad said in a statement that it was the "victim of a criminal cyber attack, which resulted in the theft of Apple UDIDs from our systems." A UDID is a unique device identifier, which Apple has strongly encouraged developers to move away from for privacy reasons.

**Insider Steals Data of 2 Million Vodafone Germany Customers**

Vodafone Germany said on Thursday that an attacker with insider knowledge had stolen the personal data of two million of its customers from a server located in Germany.

**Safe and Secure User Practices**

**Security: Defense in Depth**

Defense in depth uses multiple layers of defense to address technical, personnel and operational issues. For example, a top secret document is stored in a high security building which has electronic fences on the perimeter. Motion sensors are on the ground and ID card entry is followed by biometric authentication. Key based entry and user-name password are required for accessing the document.

Every layer of security in the above scenario makes up defense in depth. If any of the layers fails to protect, then the next layer is in place to provide protection. A common example for home users is any antivirus, which provides (among other capabilities):

- an antivirus application
- a firewall application
- an anti-spam application
- parental controls
- privacy controls

![Defense in Depth Layers](image)

*Figure: 47*
Anti-Virus and Anti-Spyware

- Anti-virus software detects malware and can destroy it before any damage is done
- Install and maintain anti-virus and anti-spyware software
- Be sure to keep anti-virus software updated
- Many free and pay options exist

![Antivirus Software Logos]

Figure: 48: Types of commercially available antivirus

Firewall

A firewall acts as a wall between your computer/private network and the internet. Hackers may use the internet to find, use, and install applications on your computer. A firewall prevents hacker connections from entering your computer. It filters packets that enter or leave your computer.

![Firewall Setting]

Figure: 49: Windows default firewall
Protect your Operating System

Microsoft regularly issues patches or updates to solve security problems in their software. If these are not applied, it leaves your computer vulnerable to hackers. The Windows Update feature built into Windows can be set up to automatically download and install updates. Avoid logging in as administrator.

Creating a good Password

<table>
<thead>
<tr>
<th>Combine 2 unrelated + = words</th>
<th>Mail + phone=m@!lf0n3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abbreviate a phrase</td>
<td>My favorite color is blue= Mfciblue</td>
</tr>
<tr>
<td>Music lyric</td>
<td>Happy birthday to you,</td>
</tr>
<tr>
<td></td>
<td>happy birthday to you,</td>
</tr>
<tr>
<td></td>
<td>happy birthday dear John,</td>
</tr>
<tr>
<td></td>
<td>happy birthday to you.</td>
</tr>
<tr>
<td></td>
<td>hb2uhb2uhbd.Jhb2u</td>
</tr>
</tbody>
</table>

Figure: 50

Creating a good password

Figure: 51
Password Recommendations

Never use admin or root or administrator as a login for the admin

A good password is:

- private: it is used and known by one person only
- secret: it does not appear in clear text in any file or program or on a piece of paper pinned to the terminal
- easily remembered: so there is no need to write it down
- at least 8 characters, complex: a mixture of at least 3 of the following: upper case letters, lower case letters, digits and punctuation
- not guessable by any program in a reasonable time, for instance less than one week.
- changed regularly: a good change policy is every 3 months

Beware that someone may see you typing it. If you accidentally type your password instead of your login name, it may appear in system log files

Avoid Social Engineering & Malicious Software

- Do not open email attachments unless you are expecting the email with the attachment and you trust the sender.
- Do not click on links in emails unless you are absolutely sure of their validity.
- Only visit and/or download software from web pages you trust.

Other Hacker tricks to avoid

- Be sure to have a good firewall or pop-up blocker installed
- Pop-up blockers do not always block ALL pop-ups so always close a pop-up window using the ‘X’ in the upper corner.
- Never click “yes,” “accept” or even “cancel”

Infected USB drives are often left unattended by hackers in public places.
Secure Online Banking and Business

- Always use secure browser to do online activities.
- Frequently delete temp files, cookies, history, saved passwords etc.

Figure: 53: Example of secure website

Backup Important Information

- No security measure is 100%
- What information is important to you?
- Is your back-up:
  - Recent?
  - Off-site & Secure?
  - Process Documented?
  - Tested/Encrypted?
Chapter 11

Electronic Transaction Act

Introduction to Electronic Transaction Act

It is means to make, legal provisions for authentication and regularization of the recognition, validity, integrity and reliability of generation, production, processing, storage, communication and transmission system of electronic records by making the transactions to be carried out by means of electronic data exchange or by any other means of electronic communications, reliable and secured, and where as, for controlling the acts of unauthorized use of electronic records or of making amendment in such records through the illegal manner.

Introduction to digital signature

A digital signature is an electric signature, just like your handwritten signature, is used to authenticate your identity. Public-key cryptography makes this possible. Public-key cryptography involves the use of two cryptographic keys, one private and one public. Whatever the public key encrypts, the private key can decrypt, and vice versa. The user (say Shyam) keeps his private key and the public key is available to anyone. Suppose Shyam wants to send a message to Sita, how does a digital signature work? Shyam uses digital signature software to pass the message through a mathematic function (so-called one-way hashing) then produces a message digest which is the summary (hash code) of the message [1, 2]. Shyam then uses the software to encrypt the message digest with his private key. The result is the digital signature. Then Shyam appends the digital signature to the document and sends it to Sita.

Is a digital signature reliable?

When Sita gets Shyam’s document, she uses his public key to decrypt the signature then gets a message digest. If this works, it proves that the signature is from Shyam because only Shyam owns the private key. Sita then runs the message through the same hashing function used by Shyam to get a message digest. If the two processes produce the same message digest, Sita knows the message is originally from Shyam and has not been changed. We know this is reliable because: (1) it is not possible to get the original message from the message digest because the hash function is one-way (2) the message encrypted by Shyam’s private key can only be decrypted by Shyam’s public key.

Introduction to Public Key Infrastructure (PKI)

In a PKI system, each user has two keys: a public key and a private key. These keys can be used for encrypting and decrypting information, for electronically signing electronic information, and for verifying the authenticity of their owner. This document focuses on the usage of PKI technology as related to electronic signatures only.
In a PKI system, the public key is distributed widely, while the corresponding private key is held by its owner in a secure place. While both keys are mathematically related, the public key cannot reveal the private key. This makes Public Key Infrastructure a great technology for digital signatures. As an example, when Sita wants to sign a document and send it to Shyam, she is performing a mathematical function by using her private key. She then sends the original document, along with its signature and her public key, to Shyam. In order for Shyam to ensure that the document actually came from Sita, Shyam applies a certain computation method to the signature (known as a signature verification), using the public key. As a result, he gets a document fingerprint. If it is the same fingerprint as the document that Sita had sent him, then Sita’s signature is verified. Otherwise, Shyam knows that Sita was not the one signing this document, or that the document has been changed from the time that Sita had signed it.

Since only Sita knows her private key, and since this key cannot be computed from the public key, data-integrity and non-repudiation are ensured. This process results in signer accountability. In other words, in a courtroom the signer can never claim he/she hasn’t signed the document.

PKI for security purposes is useful, but there is still an ingredient missing. How can Shyam know whether Sita, who had sent him the signed document, is indeed the same Sita that he wants to conduct business with? Shyam needs certification from a trusted third party who knows Sita and can verify that she is indeed who she claims to be. Such entities are called PKI Certificate Authorities (CA); they issue PKI certificates to ensure the authenticity of the signer. PKI certificates can be compared to passports issued by countries to their citizens for world travel. When a traveler arrives at a foreign country, there is no way for authenticating the traveler’s identity but to trust the passport issuer (in PKI terminology: the CA) and use the passport to authenticate its holder in the same way that Shyam uses the CA’s certificate for authenticating Sita’s identity.

**Why Use PKI-based Digital Signatures?**

In today’s business and legal systems, paper-based signatures are the most common legal way to ensure the accountability of the signer. Despite the fact that signature forgery is prevalent, signatures are still the most popular (and legal) method used in business today. As more organizations and businesses migrate from paper to electronic transactions, better signer accountability is needed in the electronic world. Basic digital signatures were devised and have become legal in most parts of the world during the past couple of years.

The EU Directive recognized this vulnerability and defined in the Directive a stronger type of electronic signature, the Advanced Electronic Signature. Although the Directive had done its best to remain technology-neutral, only Public Key Infrastructure (PKI) digital signatures meet the requirements for such signatures. Advanced digital signatures provide not only stronger user authentication, but also protect the integrity of the data signed, thus ensuring non-repudiation of the transaction by the signer.

Strong signatures are critical to your organization. Basic electronic signatures that are not PKI based are vulnerable solutions that add data (text, sound, symbol, picture etc.) to a document and can only
serve as a weak method of signer authentication. Only Public Key Infrastructure (PKI)-based digital signatures offer the best technology to protect against forgery by providing data integrity and non-repudiation.

But as mentioned briefly earlier, PKI has had its own problems preventing it from becoming the leading technology for digital signatures. In the next section we shall discuss the deployment problems of PKI based systems.

**Cybercrime**

Cybercrime is one of the fastest growing areas of crime. More and more criminals are exploiting the speed, convenience and anonymity that modern technologies offer in order to commit a diverse range of criminal activities. These include attacks against computer data and systems, identity theft, the distribution of child sexual abuse images, internet auction fraud, the penetration of online financial services, as well as the deployment of viruses, Botnets, and various email scams such as phishing.

The global nature of the Internet has allowed criminals to commit almost any illegal activity anywhere in the world, making it essential for all countries to adapt their domestic offline controls to cover crimes carried out in cyberspace. The use of the Internet by terrorists, particularly for recruitment and the incitement of radicalization, poses a serious threat to national and international security.

In addition, the threat of terrorism forces authorities to address security vulnerabilities related to information technology infrastructure such as power plants, electrical grids, information systems and the computer systems of government and major companies.

**The changing nature of cybercrime**

In the past, cybercrime has been committed by individuals or small groups of individuals. However, we are now seeing an emerging trend with traditional organized crime syndicates and criminally minded technology professionals working together and pooling their resources and expertise.

This approach has been very effective for the criminals involved. In 2007 and 2008 the cost of cybercrime worldwide was estimated at approximately USD 8 billion. As for corporate cyber espionage, cyber criminals have stolen intellectual property from businesses worldwide worth up to USD 1 trillion.

**Problems and challenges**

Nepal’s cyber world is ruled by Electronic Transaction Act (ETA) 2063 that protects users online against cyber crimes. Though the cyber law is present but due to lack of proper monitoring and updates it serves little use in protecting users online. The dynamics of internet has grown phenomenally where the ETA has been fixed and constant. Internet provides easy accessibility and other facilities but at the
same technology also threatens the nation in lack of proper mechanism and policies which needs to be researched and worked on.

Nepal has seen ups and downs in its technology but due to its limited policies and regulation Nepal faces a huge hindrance in the coming days. Technology has been passed on but with little governance, and lack of proper mechanism and measures to cater the need at time of emergency, Nepal faces a huge threat or challenge in overcoming the online threat.

Cyber laws have become essential in view of the rapid developments in information technology. Online communication has given rise to a new global commerce in ideas, information and services. Information Technology (IT) is changing almost all aspects of human activity like communication, trade, culture, education, entertainment, and knowledge. With the rapid advances in computer technology over the past few years, there has been increasing concern in many countries for the need to develop and modernize the law in order to take full advantage of technological improvements and at the same time to guarantee that states can respond to computer crime and related criminal law issues associated with these developments.

The cyber law encompasses a wide variety of legal issues which includes intellectual property, privacy, freedom of expression, and jurisdiction

**Nepal’s Case**

Prior to 2004, the government of Nepal dealt with cyber crimes under the Public Offence Act. Nepal Police dealt with cyber crimes but they were not aware about the technical aspects of these crimes, which meant that the sanctions were not effective and relative to the crime.

Later The Electronic Transaction and Digital Signature Act 2004, also known as the cyber law, was passed. This law was forecast to be landmark legislation for the development of IT industry in Nepal. Under Act of 2004, hacking, deleting data, stealing e-documents, software piracy and posting defamatory information invite criminal and civil sanctioning to individuals and institutions. Under this law, the government can punish cyber offenders with up to five years of imprisonment and/or a fine of up to fifty thousand rupees. However, much depends on the severity of the crime. The law has tightened the security for banking transactions through electronic means, which should boost the economic activities across the Internet via Nepal.

**Section 47, Electronic Transactions Act (2008), Publication of Illegal Materials in Electronic Form.** This section states that it is an offense to publish or display any material in the electronic media, including the Internet, which may be contrary to public morality or decent behavior, or which is prohibited to publish or display by the prevailing law. The penalty for this offense is a fine of 1,000 Rupees and/or up to five years’ imprisonment. Subsequent offenses will be punished for each time with a 1.5% increase of the penalty prescribed for the previous conviction

The biggest challenge before the cyber law is its integration with the legacy system of laws applicable to the physical world. The unique structure of the Internet has raised several legal concerns. While grounded in physical computers and other electronic devices, the Internet is independent of any
geographic location. While real individuals connect to the Internet and interact with others, it is possible for them to withhold personal information and make their real identities anonymous. If there are laws that could govern the Internet, then it appears that such laws would be fundamentally different from laws that geographic nations use today. Since the Internet defies geographical boundaries, national laws will no longer apply. Instead, an entirely new set of laws will be created to address concerns like intellectual property and individual rights. In effect, the Internet will exist as its own sovereign nation.
Chapter 12
Information Technology Policy

Definition

Policies are used to set a standard for performance. Through policy, an organization can develop clear expectations for students, parents, teachers and administrators. It provides a framework for consistent actions regardless of district or school in a region, or even state-wide. Federal and state laws set a policy framework for the use of technology within the school system. All states and school districts are required to have technology plans in compliance with federal policies.

ICT RELATED ACTS AND POLICIES

- Telecommunication Act, 1997 A.D.
- Telecommunication Regulation, 1997 A.D.
- Nepal Telecommunication Authority's (working procedure related) regulation, 2002 A.D.
- National Communication Policy, 1992 A.D.
- Long Term Policy of Information and Communication Sector, 2059 B.S. 2002 A.D.
- Electronic Transaction Act 2006 A.D.
- IT Policy 2010 A.D.

Figure: 54 : Nepali act and policies related to ICT

Why is IT Policy Important?
First and foremost, proper policies protect the institution from non-compliance with the law. Clear organizational guidelines allow organizational leaders to avoid overlooking any legal imperatives which might otherwise go unnoticed. In addition, ensuring that persons with disabilities are able to
communicate and learn is a moral responsibility. Accessibility benefits everyone, not just people with disabilities.

Vision

"To place Nepal on the global map of information technology within the next five years."

Background

The world's least developed countries including Nepal have availed themselves of the opportunity to rapidly develop education, health, agriculture, tourism, trade and various other sectors using information technology (IT). The extensive application of this technology will engender economic consolidation, development of democratic norms and values, proportional distribution of economic resources and enhancement of public awareness, thereby raising living standards and eventually contribute significantly to poverty alleviation. It is the information technology, which will turn out to be a strong infrastructure for mitigating Nepal's geographical adversities. In the coming years, globally, there will be a significant difference in the economic conditions of the countries developed in the field of information technology and of the countries lagging behind in this field. The persistence of such disparities may not be congenial even for the developed countries. In this context, there is a greater possibility that the international community will extend its support to developing countries in the promotion of information technology. Such assistance will certainly play a vital role in the national development of a least developed country like Nepal. Hence, it has become essential to formulate a policy at the earliest for developing information technology with a view to boosting up national economy.

Objectives

The information technology policy shall be formulated to achieve the following objectives:

- To make information technology accessible to the general public and increase employment through this means,
- To build a knowledge-based society and
- To establish knowledge-based industries

Strategies

- The following information technology strategies shall be adopted to accomplish the above-mentioned objectives through rapid development and extension of information technology in a fair and competitive manner.
- The government shall act as a promoter, facilitator and regulator.
- High priority shall be accorded to research, development and extension of information technology with participation of private sectors.
- Competent manpower shall be developed with the participation of both the public and the private sectors for the sustainable development and extension of information technology.
- Domestic and foreign investment shall be encouraged for the development of information technology and the related infrastructures.
Information technology industry shall be promoted.

Speedy and qualitative service shall be made available at a reasonable cost by creating a healthy and competitive atmosphere among information technology service providers.

Computer education shall be incorporated in academic curriculum starting from the school level.

Professional efficiency shall be enhanced through the use of information technology.

Information technology network shall be extended to rural areas.

Nepal shall be placed on the international market through information technology.

Export of services related to information technology (software and hardware) shall be increased to 10 billion rupees within the next five years.

Nepal shall be placed on the global map of information technology.

E-commerce shall be promoted with legal provisions.

Information technology shall be used to assist e-governance.

Information technology shall be applied for rural development.

Challenges:

IT policy is a significant and important step in the right direction towards the developing the ICT sector and represent the society as knowledge based society. But however several challenges have beset Nepal’s efforts aimed at building upon the initial momentum that it gained in the ICT domain. Due to the lack of political constancy deterred Nepal from effectively capitalizing on the promise Unleashed by digital opportunities as the country found itself confronting a host of competing priorities ranging from the ones posed by security challenges to that of endemic poverty and poor governance. In the planning process, the government expressed its desire to meld Nepal into a knowledge-based society. The broad objective for the IT sector was to promote IT as a tool for social and economic development; to promote social development by using IT to improve agricultural, health, education, and other services and sectors; to promote economic development by establishing an IT park to produce and export low-cost software and eliminate the poverty from country which is the one of major problem for Nepal.

We have the experience of failure for completely implementing the Policy and over the last few years with scarce resources tied up in security efforts, implementation of the IT Policy has slipped from the government’s priority list. Although the institutional provisions have been put in place, the key implementing body is too under-resourced to effectively oversee implementation. We also know that e-governance in Nepal is enhancing but still not fully developed. But we can assume this process of finalizing the IT policy was a long but inclusive one.

Today we have still many problems. Political and Social Instability, Funding depend upon highly politicized and very limited facility is provided by government which is not enough and it is not fully utilized are problem in past years. So from learning the lesson from previous chapter of implementing and developing IT Policies we have to address every aspect that reflect IT Sectors. An implementation programmed involving both the government and private sector still needs to be encouraged and supported to maximize the potential for IT in Nepal.