# Internet and Internet Services

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# Introduction

- The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (often called TCP/IP, although not all applications use TCP) to serve billions of users worldwide.
- It is a ***network of networks*** that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies.
- The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support email.

# Introduction (Contd.)

- Internet is a short form of the technical term internetwork, the result of interconnecting computer networks with special gateways or routers. The Internet is also often referred to as the Net.
- The terms Internet and World Wide Web are often used in everyday speech without much distinction.
- However, the ***Internet*** and the ***World Wide Web*** are not one and the same.
- The Internet establishes a global data communications system between computers. In contrast, the Web is one of the services communicated via the Internet. It is a collection of interconnected documents and other resources, linked by hyperlinks and URLs.

# Evolution or (History) of Internet

- The ***Internet*** is a worldwide collection of separate, but interconnected, networks accessed daily by millions of people using a variety of devices to obtain information, disseminate information, access entertainment, or communicate with others.
- While ***Internet*** has become a household word only during the past two decades or so, it has actually operated in one form or another for much longer than that.
- The growth of internet can be discussed from **ARPANET** to **Internet2**.
- The roots of the Internet began with an experimental project called ***ARPANET***. The Internet we know today is the result of the evolution of ARPANET and the creation of the **W**orld **W**ide **W**eb (**WWW**).

# Evolution of Internet - ARPANET

- The U.S. Department of Defense **A**dvanced **R**esearch **P**rojects **A**gency (**ARPA**) created ARPANET in 1969.
- One objective of the ARPANET project was to create a computer network that would allow researchers located in different places to communicate with each other.
- Another objective was to build a computer network capable of sending or receiving data over a variety of paths to ensure that network communications could continue even if part of the network was destroyed, such as in a nuclear attack or by a natural disaster.
- Initially, ARPANET connected four supercomputers and enabled researchers at a few dozen academic institutions to communicate with each other and with government agencies.
- As the project grew during the next decade, students were granted access to ARPANET as hundreds of college and university networks were connected to it.
- These networks consisted of a mixture of different computers so, over the years, protocols were developed for tying this mix of computers and networks together, for transferring data over the network, and for ensuring that data was transferred intact.

# Evolution of Internet - WWW

- In its early years, the Internet was used primarily by the government, scientists, and educational institutions.
- Despite its popularity in academia and with government researchers, the Internet went virtually unnoticed by the public and the business community for over two decades because:
  - it required a computer.
  - it was hard to use.
- As always, however, computer and networking technology improved and new applications quickly followed. Then, in 1989, a researcher named Tim Berners-Lee proposed the idea of the World Wide Web (WWW).
- He envisioned the World Wide Web as a way to organize information in the form of pages linked together through selectable text or images (which are today's hyperlinks) on the screen.
- Although the introduction of Web pages did not replace all other Internet resources (such as e-mail and collections of downloadable files), it became a popular way for researchers to provide written information to others.

# Evolution of Internet - WWW

- In 1993, a group of professors and their students at the University of Illinois National Center for Supercomputing Applications (NCSA) released the Mosaic Web browser.
- Soon after, use of the World Wide Web began to increase dramatically because Mosaic's graphical user interface (GUI) and its ability to display images on Web pages made using the World Wide Web both easier and more fun than in the past.
- Today's Web pages are a true multimedia, interactive experience, they can contain text, graphics, animation, sound, video, and three-dimensional virtual reality objects.
- A growing number of today's Web-based applications and services are referred to as ***Web 2.0*** applications. Although there is no precise definition, ***Web 2.0*** generally refers to applications and services that use the Web as a platform to deliver rich applications that enable people to collaborate, socialize, and share information online.
- Some Web 2.0 applications are cloud computing, social networking sites, RSS feeds, podcasts, blogs, and wikis.

# Evolution of Internet – WWW (Contd.)

- Although the Web is only part of the Internet, it is by far the most widely used part. Today, most companies regard their use of the Internet and their World Wide Web presence as indispensable competitive business tools, and many individuals view the Internet—and especially the Web—as a vital research, communications, and entertainment medium.
- One remarkable characteristic of both the Internet and World Wide Web is that they are not owned by any person or business, and no single person, business, or organization is in charge.
- Web pages are developed by individuals and organizations, and are hosted on Web servers owned by individuals, schools, businesses, or other entities.
- Each network connected to the Internet is privately owned and managed individually by that network's administrator, and the primary infrastructure that makes up the Internet backbone is typically owned by communications companies, such as telephone and cable companies.

# Evolution of Internet – WWW (Contd.)

- In addition, the computers and other devices used to access the Internet belong to individuals or organizations. So, while individual components of the Internet are owned by individuals and organizations, the Internet as a whole has no owner or network administrator.
- The closest the Internet comes to having a governing body is a group of organizations that are involved with issues such as establishing the protocols used on the Internet, making recommendations for changes, and encouraging cooperation between and coordinating communications among the networks connected to the Internet.

# Evolution of Internet – Internet2

- ***Internet2*** is a consortium of researchers, educators, and technology leaders from industry, government, and the international community that is dedicated to the development of revolutionary Internet technologies.
- Internet2 uses high-performance networks linking over 200 member institutions to deploy and test new network applications and technologies.
- Internet2 is designed as a research and development tool to help develop technologies that ensure the Internet in the future can handle tomorrow's applications, and it is now being used to deploy advanced applications and technologies that might not be possible otherwise with today's Internet.
- Much of Internet2 research is focused on speed. In fact, the Internet2 backbone network was recently upgraded to support 8.8 Tbps. This network is the first national network to use 100 Gigabit Ethernet over its entire footprint; it will be used to support high bandwidth applications, such as telemedicine and distance learning, to schools, libraries, hospitals, and other organizations.

# Internet Architecture

- Internet is a network of interconnected networks and is designed to operate without a central control. If a portion of the network fails, connection is made through alternative paths available. The architecture of Internet is hierarchical in nature. A brief description of the architecture of Internet are as follows:
- **Client:**
  - Client (user of computer) at home or in a LAN network is at the lowest level in hierarchy.
- **Local ISP:**
  - Local Internet Service Provider (**ISP**) is at the next higher level.
  - An ISP is an organization that has its own computers connected to the Internet and provides facility to individual users to connect to Internet through their computers.
  - Local ISP is the local telephone company located in the telephone switching office, where the telephone of client terminates. Examples of local ISP in Nepal are Nepal Telecom, World Link, etc.
  - The client calls local ISP using a modem or Network Interface Card.

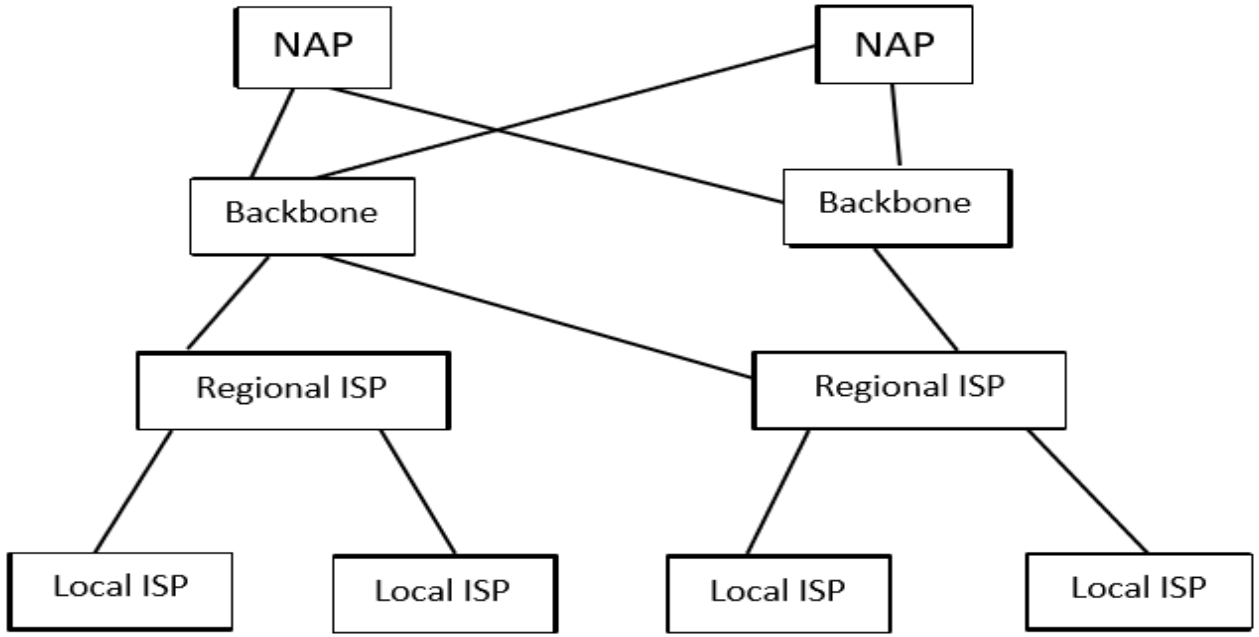
# Internet Architecture (Contd.)

- **Regional ISP:**
  - Regional ISP is next in the hierarchy. The local ISP is connected to regional ISP.
  - A ***router*** is a special hardware system consisting of a processor, memory, and an I/O interface, used for the purpose of interconnecting networks. A router can interconnect networks having different technologies, different media, and physical addressing schemes or frame formats.
  - The regional ISP connects the local ISP's located in various cities via ***routers***.
  - If the packet received by regional ISP is for a client connected to this regional ISP, then the packet is delivered; otherwise, packet is sent to the regional ISP's backbone.

# Internet Architecture (Contd.)

- **Backbone:**
  - Backbone is at top of the hierarchy.
  - Backbones are typically fiber optic trunk lines. The trunk line has multiple fiber optic cables combined together to increase the capacity. Fiber optic cables are designated ***OC for optical carrier***, such as ***OC-3***, ***OC-12*** or ***OC-48***. An OC-3 line is capable of transmitting 155 Mbps while an OC-48 can transmit 2,488 Mbps (2.488 Gbps). Compare that to a typical 56K modem transmitting 56,000 bps and you see just how fast a modern backbone is.
  - Backbone operators are large corporations like AT&T which have their own server farms connected to the backbone. There are many backbones existing in the world.
  - The backbone networks are connected to Regional ISP's with a large number of routers through high speed fiber-optics.
  - **N**etwork **A**ccess **P**oint (**NAP**) connects different backbones, so that packets travel across different backbones.
  - If a packet at the backbone is for a regional ISP connected to this backbone, the packet is sent to the closest router to be routed to local ISP and then to its destination; otherwise, packet is sent to other backbone via ***NAP***. The packet traverses different backbones until it reaches the backbone of regional ISP for which it is destined.

# Fig: Internet Architecture



# Managing the Internet

- Internet is not controlled by any one person or an organization. A number of organizations manage the Internet. They collectively participate in the research, development and management of the internet. Some of the governing bodies of the Internet and their functions are:

| Governing Bodies of Internet | Functions |
|---|---|
| Internet Society (ISOC) | • Provides information about Internet<br>• Responsible for development of standards and protocols related to Internet |
| Internet Architecture Board (IAB) | • Advisory group of ISOC<br>• Responsible for development of Internet architecture |
| Internet Engineering Task Force (IETF) | • Community of network designers, operators, vendors, and researchers<br>• Responsible for evolution of Internet<br>• Open to all individuals |
| Internet Engineering Steering Group (IESG) | • Reviews standards developed by IETF |
| Internet Research Task Force (IRTF) | • Focuses on research towards the future of Internet (Internet protocol, architecture etc.) |
| Internet Assigned Number Authority (IANA) | • Allots IP address to organizations and individuals |
| Internet Network Information Center (InterNIC) | • Responsible for domain name registration |
| World Wide Web Consortium (W3C) | • Responsible for development of technologies for World Wide Web |

# Connecting to the Internet

- To be able to connect computer to the network, it require:
  - A TCP/IP enabled computer
  - Software (Web browser)
  - An account with an ISP
  - Connection line(telephone line, coaxial cable or fiber connection)
  - Hardware (like modem or Network Interface Card (NIC) to connect computer to the networking Governing Bodies of Internet Functions.

# Internet Connection

- The **ISPs** provide Internet connections of different types. ***Bandwidth*** and ***cost*** are the two factors that help you ***(the user)*** in deciding which Internet connection to use.
- Bandwidth is the amount of data that can be transferred through a communication medium in a fixed amount of time. The speed of Internet access depends on the bandwidth. The speed of Internet access increases with the increase in bandwidth.
- ISPs offer low speed Internet connection like ***Dial-up connection***, and high-speed Internet connection called ***broadband connection***. Broadband are the services with more bandwidth than standard telephone service.
- ***Digital Subscriber Line*** **(DSL)**, ***Cable modem***, and ***Integrated Services Digital Network*** **(ISDN)** are some of the existing broadband connections, each, having a different bandwidth and cost.
- Some of other connection types are: ***Dial-up Connection***, ***Cable TV Internet Connections***, ***Wireless Internet Connection*** etc.

# Internet Connection - Dial-up Access/Connection

- ***Dial-up access*** is a method of connecting to the Internet using an existing telephone line.
- When our computer is connected to the Internet, we cannot receive voice telephone calls on this telephone line during that time.
- In Dial-up access, we are assigned an account on the server of ISP along with some storage space on the disk of server.
- You connect to Internet by dialing-up one of the computers of ISP. For this, you use a telephone number provided by ISP and connect via a ***56 Kbps modem***. The computer that dials-up is the client or remote machine, and the computer of ISP is the server or host.
- The client enters the user-id and password, and gets connected to the Internet via the ISP.

# Internet Connection - Leased Line

- ***Leased line*** is a dedicated phone line that connects a computer (also known as ***gateway***) to Internet, using special kind of modems. At the other end, the gateway is connected to a large number of computers, which access the Internet via the gateway.
- The gateway forms a domain on Internet, e.g. ekantipur.com, which is used to provide connection to the other computers on the Internet to connect to it.
- Leased lines provide reliable and high-speed Internet access.
- Leased lines are generally used by large organizations and universities that have their own internal network, and have large number of users.

# Internet Connection - ISDN

- **I**ntegrated **S**ervices **D**igital **N**etwork (**ISDN**) is a digital telephone service that can transmit voice, data and control information over an existing single telephone line.
- Internet access is faster using ISDN than Dial-up access.
- ISDN is commonly used for business purposes. You are able to connect a computer, a fax machine or a telephone to a single ISDN line, and also use them simultaneously.
- ISDN is costlier than Dial-up connection. It requires a special phone service and modem.
- Nowadays, ISDN services are largely being replaced by high speed broadband connection.

# Internet Connection - DSL

- **D**igital **S**ubscriber **L**ine **(DSL)** is a broadband connection that allows connecting to Internet over the existing telephone lines. It does not affect your telephone voice services.
- DSL uses the modem provided by ISP.
- The data transmission speed of DSL ranges from 128 Kbps to 8.448 Mbps.
- Asymmetric DSL (ADSL), a variant of DSL, provides high-speed delivery of download data (from Internet to user), than that for upload (from user to Internet), since most users download much more than they upload.

# Internet Connection - Cable Modem

- The user can connect to the Internet via a ***cable modem*** through cable television. The cable modem provides two connections—one for television and other for computer.
- The ***cable modem*** sends and receives data through the coaxial cable which connects the cable modem to the cable service provider.
- Coaxial cables allow transmission of Internet data, audio, and video, and control over its several channels simultaneously. The user can access the Internet and watch television at the same time.
- Like ***DSL***, cable modem provides high-speed Internet connection. However, while using cable modem, the bandwidth is shared by many users. If many users access the Internet simultaneously then the available bandwidth for each of the user reduces.

# Internet Protocol - IP Addresses

- Every machine on the Internet has a unique identifying number, called an **IP Address**. The **IP** stands for **Internet Protocol**, which is the language that computers use to communicate over the Internet.
- A protocol is the pre-defined way that someone who wants to use a service talks with that service. The "someone" could be a person, but more often it is a computer program like a Web browser.
- A typical IP address looks like this: **216.27.61.137**
- To make it easier for us humans to remember, IP addresses are normally expressed in decimal format as a dotted decimal number like the one above. But computers communicate in binary form.
- Look at the same IP address in binary: **11011000.00011011.00111101.10001001**

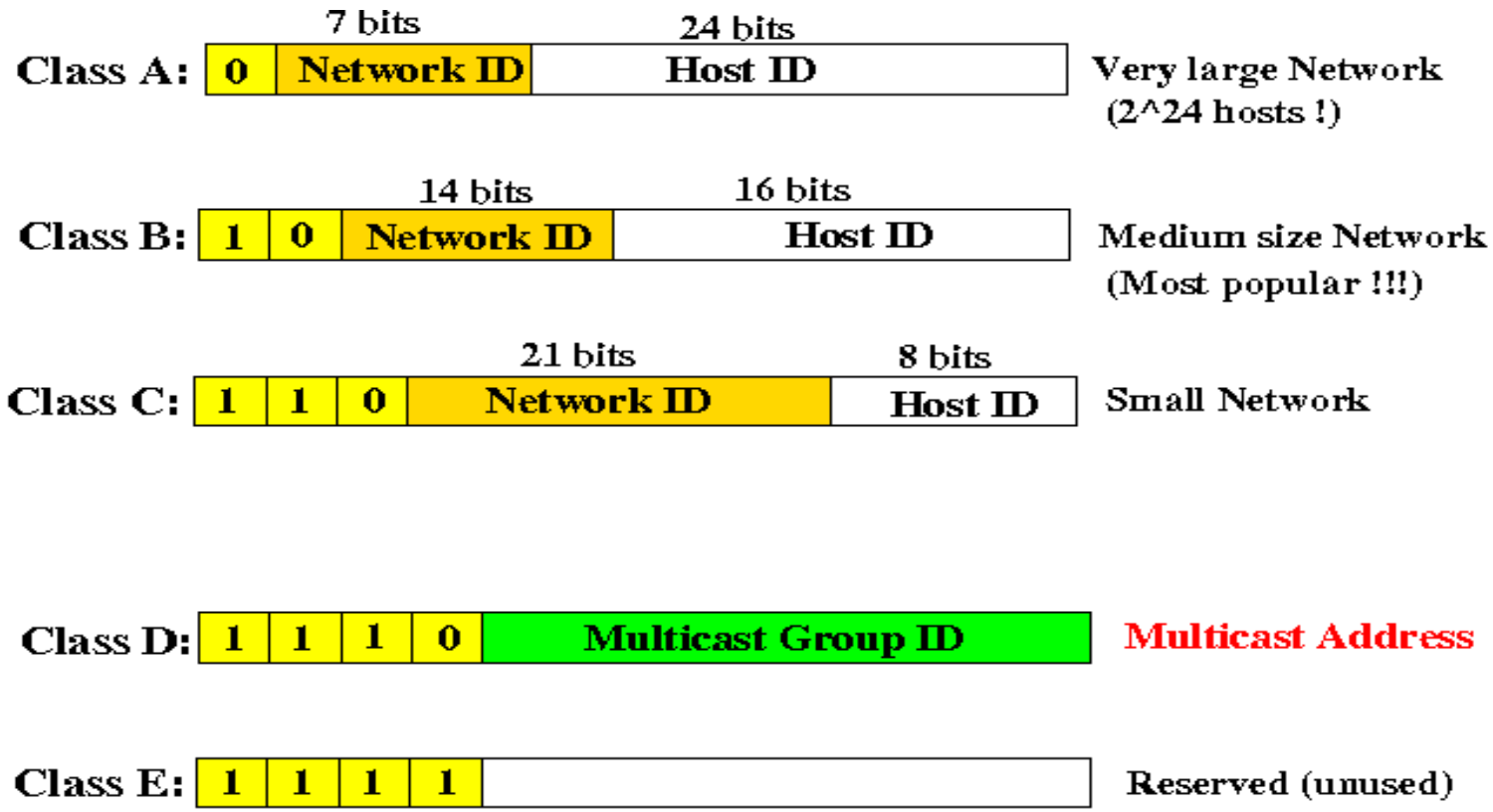
# Internet Protocol - IP Addresses (Contd.)

- The four numbers in an IP address are called ***octets***, because they each have eight positions when viewed in binary form. If you add all the positions together, you get 32, which is why IP addresses are considered 32-bit numbers.
- Since each of the eight positions can have two different states (1 or zero), the total number of possible combinations per octet is $2^8$ or 256. So each octet can contain any value between zero and 255. Combine the four octets and you get $2^{32}$ or a possible 4,294,967,296 unique values!
- Out of the almost 4.3 billion possible combinations, certain values are restricted from use as typical IP addresses. For example, the IP address **0.0.0.0** is reserved for the **default network** and the address **255.255.255.255** is used for **broadcasts**.

# Internet Protocol - IP Addresses (Contd.)

- The octets serve a purpose other than simply separating the numbers. They are used to create classes of IP addresses that can be assigned to a particular business, government or other entity based on size and need.
- The octets are split into two sections: ***Net*** and ***Host***. The Net section always contains the first octet. It is used to identify the network that a computer belongs to. Host (sometimes referred to as ***Node***) identifies the actual computer on the network. The Host section always contains the last octet.
- In the IPv4 IP address space, there are five classes: **A**, **B**, **C**, **D** and **E**. Each class has a specific range of IP addresses (and ultimately dictates the number of devices you can have on your network).
- Primarily, class **A**, **B**, and **C** are used by the majority of devices on the Internet. Class D and class E are for special uses (i.e. **class D** is for multicast networking and the **class E** address range is reserved for future or experimental purposes).

# Fig: IPV4 address formats



# Fig: IPV4 address formats

| CLASS | LEADING BITS | NET ID BITS | HOST ID BITS | NO. OF NETWORKS | ADDRESSES PER NETWORK | START ADDRESS | END ADDRESS |
|---|---|---|---|---|---|---|---|
| CLASS A | 0 | 8 | 24 | $2^{7}$ ( 128 ) | $2^{24}$ (16,777,216) | 0.0.0.0 | 127.255.255.255 |
| CLASS B | 10 | 16 | 16 | $2^{14}$ ( 16,384 ) | $2^{16}$ ( 65,536 ) | 128.0.0.0 | 191.255.255.255 |
| CLASS C | 110 | 24 | 8 | $2^{21}$ ( 2,097,152 ) | $2^{8}$ ( 256 ) | 192.0.0.0 | 223.255.255.255 |
| CLASS D | 1110 | NOT DEFINED | NOT DEFINED | NOT DEFINED | NOT DEFINED | 224.0.0.0 | 239.255.255.255 |
| CLASS E | 1111 | NOT DEFINED | NOT DEFINED | NOT DEFINED | NOT DEFINED | 240.0.0.0 | 255.255.255.255 |

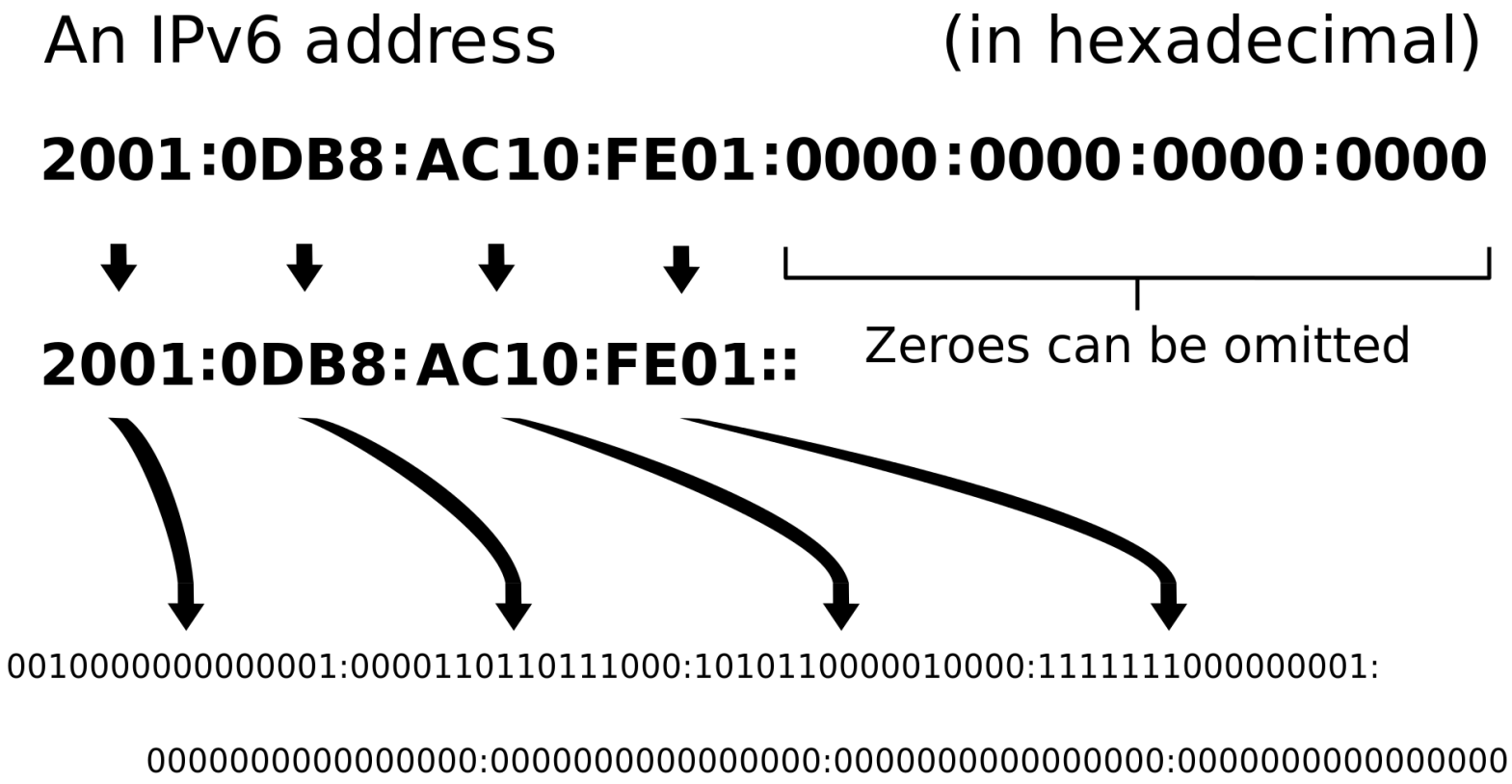
# Fig: IPV4 (Private IP Vs Public IP)

| Private IP | Public IP |
|---|---|
| Used with LAN or Network | Used on Public Network |
| Not recognized over Internet | Recognized over Internet |
| Assigned by LAN administrator | Assigned by Service provider / IANA |
| Unique only in LAN | Unique Globally |
| Free of charge | Cost associated with using Public IP |
| Range –<br>Class A -10.0.0.0 to 10.255.255.255<br>Class B – 172.16.0.0 to 172.31.255.255<br>Class C – 192.168.0.0 – 192.168.255.255 | Range –<br>Class A -1.0.0.0 to 9.255.255.255<br>11.0.0.0 – 126.255.255.255<br>Class B -128.0.0.0 to 172.15.255.255<br>172.32.0.0 to 191.255.255.255<br>Class C -192.0.0.0 – 192.167.255.255<br>192.169.0.0 to 223.255.255.255 |

# Internet Protocol - IP Addresses (Contd.)

- An **IPv6 address** is a 128-bits alphanumeric value that identifies an endpoint device in an Internet Protocol Version 6 (IPv6) network. IPv6 is the successor to a previous addressing infrastructure, IPv4, which had limitations IPv6 was designed to overcome. Notably, IPv6 has drastically increased address space compared to IPv4.
- An IPv6 address is represented as eight groups of four hexadecimal digits, each group representing 16 bits The groups are separated by colons (:).
- An example of an IPv6 address is: **2001:0db8:85a3:0000:0000:8a2e:0370:7334**
- **IP addresses** have the following ***characteristics*** in common:
  - IP addresses are unique
  - No two machines can have the same IP number
  - IP addresses are also global and standardized
  - All machines connected to the internet agree to use the same scheme for establishing an address

# Fig: IPV6 address formats



# Internet Protocol - DNS

- When the Internet was in its infancy, it consisted of a small number of computers hooked together with modems and telephone lines. You could only make connections by providing the IP address of the computer you wanted to establish a link with.
- For example, a typical IP address might be 216.27.22.162. This was fine when there were only a few hosts out there, but it became unwieldy as more and more systems came online.
- The first solution to the problem was a simple text file maintained by the Network Information Center that mapped names to IP addresses. Soon this text file became so large it was too cumbersome to manage. In 1983, the University of Wisconsin created the ***Domain Name System*** (**DNS**), which maps text names to IP addresses automatically. This way you only need to remember ***https://www.youtube.com***, for example, instead of ***YouTube IP address***.

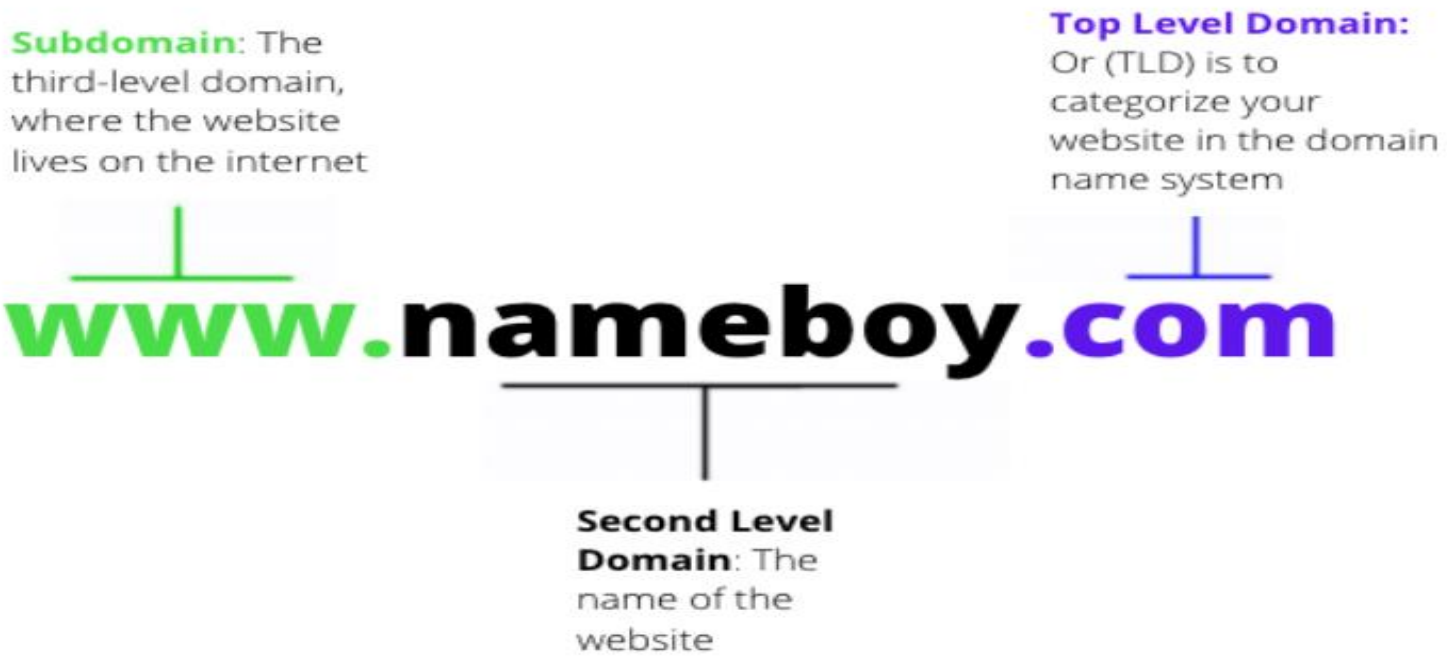
# Internet Protocol – DNS (Contd.)

- Some organizational generic domains are:
  - **com:** Commercial Organizations
  - **int:** International Organizations
  - **gov:** Government Organizations
  - **edu:** Educational Institutions
  - **mil:** U.S. Military Institutions
  - **net:** Networking Organizations
  - **org:** Non-profit Organizations
  - **co:** For Companies
  - **ac:** For Academics
  - **net:** For gateways and administrative hosts

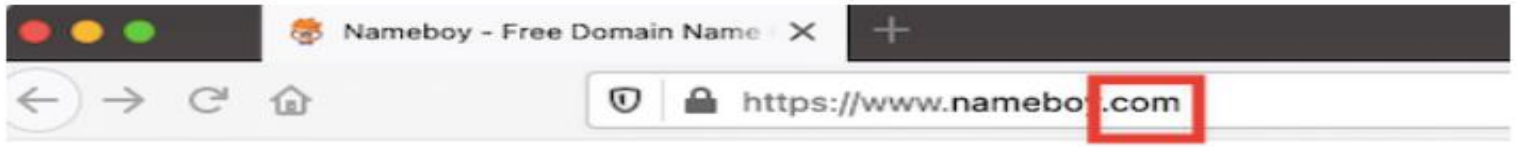
- Some new generic domains are:
  - **biz:** Business
  - **info:** Information
  - **name:** People's name
  - **pro:** Professionals such as doctor, lawyer etc.
  - **aero:** Aerospace Industries
  - **coop:** Co-operative
  - **museum:** Museums

- Some **ccTLD** (Country Code TLD) are:
  - .**np:** Nepal
  - **.us:** USA
  - **.eu:** European Union

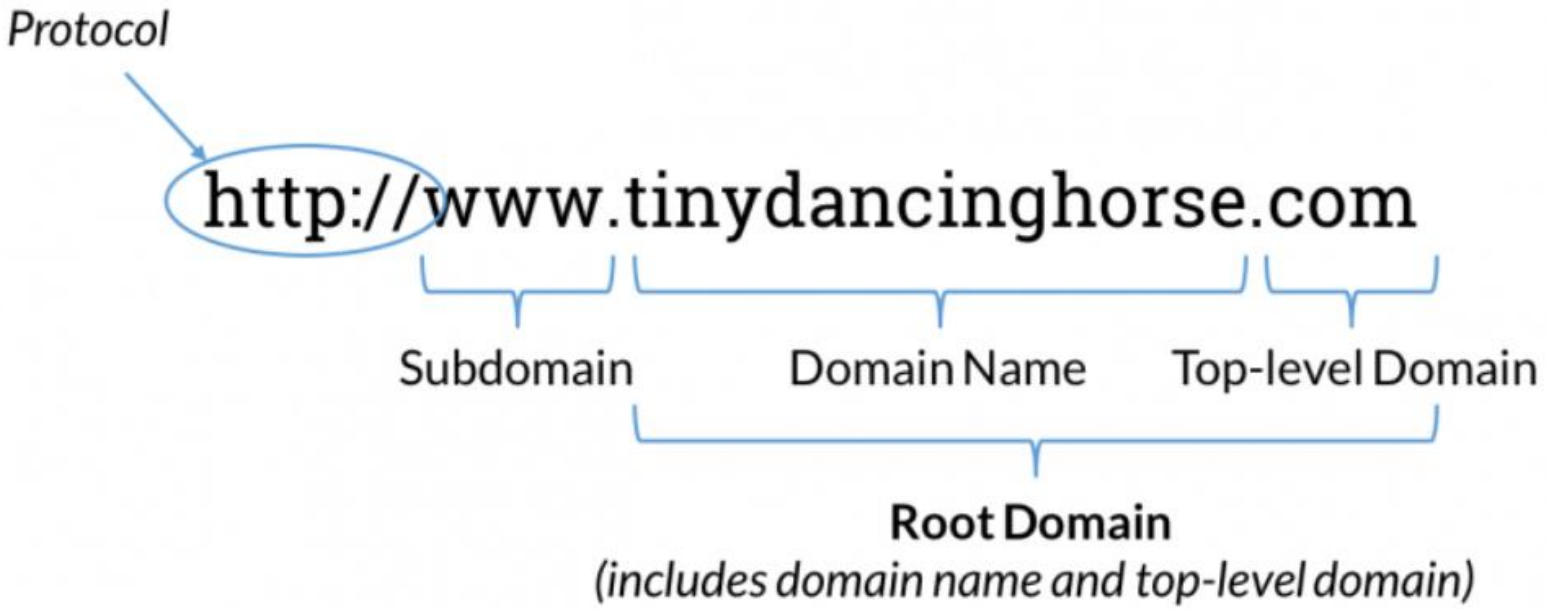
# Figure 1: DNS




And, here's where to find your TLD in the search bar:



# Figure 2: DNS


Protocol
http://www.tinydancinghorse.com
Subdomain
Domain Name
Top-level Domain
Root Domain
(includes domain name and top-level domain)

# Figure 3: DNS


subdomain
subdomain
subdomain
https:// www.shop.example.com
fourth level domain
third level domain
second level domain
top level domain
subdomain
subdomain
subdomain
https:// www.example.co.uk
fourth level domain
third level domain
second level domain
top level domain

# Internet Protocol – DNS (Contd.)

- Each domain name corresponds to an IP address. The ***DNS server*** is responsible for translation of ***domain names*** to ***IP address***.
- **D**omain **N**ame **S**ystem (**DNS**) server is a computer having a database that stores the IP addresses and their domain names. Whenever a user uses the domain name, DNS translates it into corresponding IP address, to access the computer on Internet.
- **Example:** (***How DNS Server Works?)***
  - Let's say that you type the URL ***http://computer.howstuffworks.com/*** into your browser.
  - The browser contacts a ***DNS server*** to get the IP address. A DNS server would start its search for an IP address by contacting one of the root DNS servers. The root servers know the IP addresses for all of the DNS servers that handle the top-level domains (.COM, .NET, .ORG, etc.). Your DNS server would ask the root for ***www.howstuffworks.com***, and the root would say, "I don't know the IP address for ***www.howstuffworks.com***, but here's the IP address for the .COM DNS server."

# Internet Protocol – DNS (Contd.)

- Your ***name server*** then sends a query to the .COM DNS server asking it if it knows the IP address for ***www.howstuffworks.com.*** The DNS server for the .COM domain knows the IP addresses for the name servers handling the ***http://computer.howstuffworks.com/*** domain, so it returns those.
- Your name server then contacts the DNS server for ***http://computer.howstuffworks.com/*** and asks if it knows the IP address for ***http://computer.howstuffworks.com/***. It actually does, so it returns the IP address to your DNS server, which returns it to the browser, which can then contact the server for ***http://computer.howstuffworks.com/*** to get a Web page.

# Internet Protocol – DNS (Contd.)

- DNS servers accept requests from programs and other name servers to convert domain names into IP addresses. When a request comes in, the DNS server can do one of four things with it:
  - It can answer the request with an IP address because it already knows the IP address for the requested domain.
  - It can contact another DNS server and try to find the IP address for the name requested. It may have to do this multiple times.
  - It can say, "I don't know the IP address for the domain you requested, but here's the IP address for a DNS server that knows more than I do."
  - It can return an error message because the requested domain name is invalid or does not exist.

# E-Commerce

# What is Commerce?

- ***According to dictionary.com,***

  *Commerce is a division of trade or production which deals with the exchange of goods and services from producer to final consumer.*

- It comprises the trading of something of economic value such as goods, services, information, or money between two or more entities.

# What is E-Commerce?

- Commonly known as ***Electronic Marketing***.
- It consist of buying and selling goods and services over an electronic systems such as the internet and other computer networks.
- ***E-commerce*** is the purchasing, selling and exchanging goods and services over computer networks ***(internet)*** through which transaction or terms of sale are performed electronically.

# Difference between e-commerce and e-business

| BASIS FOR COMPARISON | E-COMMERCE | E-BUSINESS |
|---|---|---|
| **Meaning** | Trading of merchandise, over the internet is known as E-commerce. | Running business using the internet is known as E-business. |
| **What is it?** | Subset | Superset |
| **Is it limited to monetary transactions?** | Yes | No |
| **What they carry out?** | Commercial transactions | Business transactions |
| **Approach** | Extroverted | Ambiverted |
| **Requires** | Website | Website, CRM, ERP, etc. |
| **Which network is used?** | Internet | Internet, Intranet and Extranet. |

# History of E-Commerce business in Nepal

- Online shopping in Nepal dates back to **2000** with the launch of Muncha and Thamel Dot Com the same year. Thamel dot com used to sell Khasi (goats) online during Dashain. Nepalese living abroad would order Khasi for their family back home and make payment **(remit the money)**. After receiving the money, Thamel dot com would deliver the Khasi to the doorstep of their family. Although this was limited to just Kathmandu Valley, this marked an start of ecommerce business in Nepal.

# Types of E-Commerce

**B2C – Business to consumer:**

- B2C businesses sell to their end-user. The B2C model is the most common business model, so there are many unique approaches under this umbrella.
- Anything you buy in an online store as a consumer-think wardrobe, household supplies, entertainment is done as part of a B2C transaction.
- The decision-making process for a B2C purchase is much shorter than a business-to-business (B2B) purchase, especially for items that have a lower value.
- Examples: ***Daraz***, ***Sastodeal***, ***Gyapu***, ***Foodmandu***, ***MetroTarkari*** etc.

# Types of E-Commerce (Contd.)

**B2B – Business to business:**

- In a B2B business model, a business sells its product or service to another business. Sometimes the buyer is the end user, but often the buyer resells to the consumer.
- B2B transactions generally have a longer sales cycle, but higher order value and more recurring purchases.
- Examples: Business Software (e.g., ***HR***, ***ERP***, ***Content Marketing Software***) and Business Supplies (e.g., ***Alibaba***)

# Types of E-Commerce (Contd.)

**C2B – Consumer to business:**

- C2B businesses allow individuals to sell goods and services to companies.
- In this e-commerce model, a site might allow customers to post the work they want to be completed and have businesses bid for the opportunity. Affiliate marketing services would also be considered C2B.
- Elance (now Upwork) was an early innovator in this model by helping businesses hire freelancers.
- Examples: ***Upwork***, ***Fiverr***, ***PeoplePerHour*** etc.

# Types of E-Commerce (Contd.)

**C2C – Consumer to consumer:**

- A C2C business - also called an online marketplace - connects consumers to exchange goods and services and typically make their money by charging transaction or listing fees.
- C2C businesses benefit from self-propelled growth by motivated buyers and sellers, but face a key challenge in quality control and technology maintenance.
- Examples: ***Hamrobazar (Nepal)***, ***eBay (India)***, ***Facebook Marketplace*** etc.

# The benefits of E-commerce

- The global/local marketplace
- 24/7 trading
- Start-up and running costs are low
- Search facilities are available
- Pricing opportunities (mainly Fluid Pricing)
- Gathering customer information
- Alternative income sources

# Pros Vs Cons for Consumer

## Pros For Consumer

- Lower prices
- Wider selection of product
- Products are easy to find in categories and easy to be compared
- International customer access
- No inventory needed
- Shop in the comfort of your own home
- 24/7 business hours

## Cons for Consumer

- Cannot feel, touch, or try on items.
- Shipping Costs
- Credit card frauds
- Misuse of private information (Name, Address, etc.).
- Shipping problems

# Challenges of E-Commerce business in Nepal (Contd.)

- Nepalese have a lot of free time in hand. They can walk to the store and buy things anytime. This is one of the major challenges of the E-Commerce business.
- Shopping is a group activity most of the time. Whenever one has to buy something, he/she goes to the shop with a bunch of friends. This experience is also another challenge for eCommerce sites.
- Technology and literacy of Technology.
- People are using eCommerce platforms merely to check the prices so that they can bargain while buying the product from an offline vendor. So, they are used more as a reference tool than a buying platform.

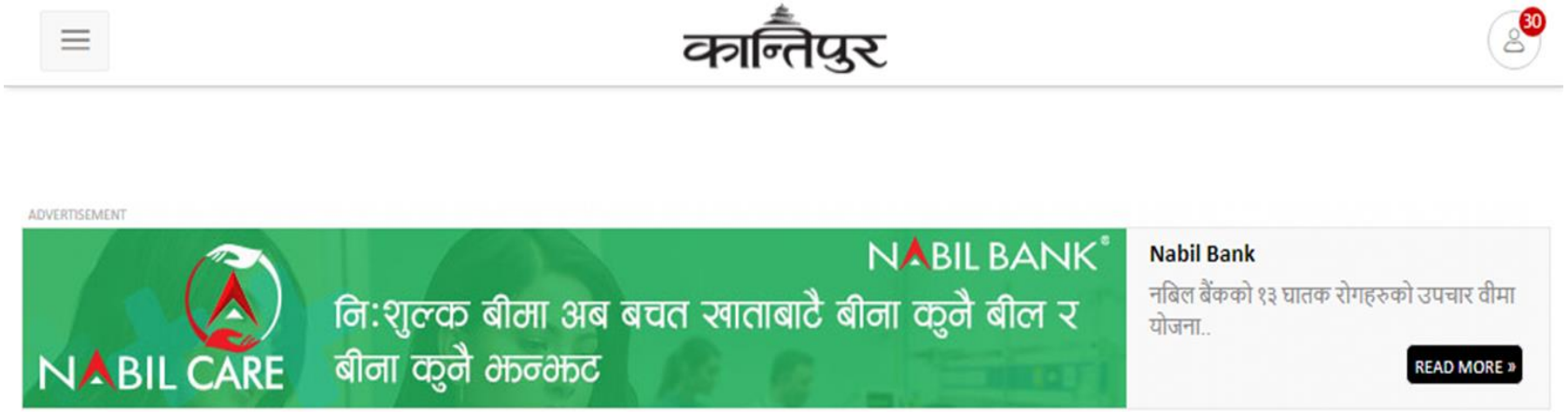
# Challenges of E-Commerce business in Nepal

- Lack of credit card and wallet system. However, this challenge is being reduced due to many e-wallet providers such as esewa, khalti and imepay. Also, banks are attempting to increase the use of credit cards.
- ***The global problem;*** missing the touch and feel of products you are buying. This problem acts as a challenge in Nepal as well.
- Delivery is another huge challenge; lack of proper street maps is also another major challenge for delivery.

# E-Governance

# आइप्याडमा 'राती' हेर्दै प्रधानमन्त्री !

# जागिर खोज्न सरकारी वेबसाइट



# जागिर खोज्न सरकारी वेबसाइट

connect IPS
pay direct from bank

# लोकसेवा आयोगको अनलाइन शुल्क भुक्तानी


## भुक्तानी गर्ने विधि:

- उम्मेदवारले फारम भरी सकेपछि *connect*IPS छनोट गरी लोक सेवाको शुल्क भुक्तानी गर्ने ।

अथवा

- *connect*IPS (www.connectips.com वा Mobile App) मा Login गरी Government Payment मेनुमा गई कारोबार संकेत नं. र शुल्क दाखिला गरी भुक्तानी गर्ने ।

Available on:
www.connectips.com Google play

NEPAL CLEARING HOUSE

A product of Nepal Clearing House Ltd.

connect IPS
pay direct from bank

अनलाईन माध्यम मार्फत्
आफ्नो बैंक खाताबाट सिधै e-Payment गर्न
connect IPS प्रयोग गर्नुहोस् ।

## connect IPS मा आवद्ध हुने विधि


1. Enroll

- www.connectips.com मा गई आवश्यक विवरण भर्ने ।
- आफ्नो Username बनाउने ।
- आफ्नो Mobile No. र E-mail Verify गर्ने ।


2. Link Bank Account

- *connect*IPS मा Login गरी आफ्नो बैंक खाताको विवरण भर्ने ।
- उक्त विवरण सहितको फाराम Download गर्ने ।

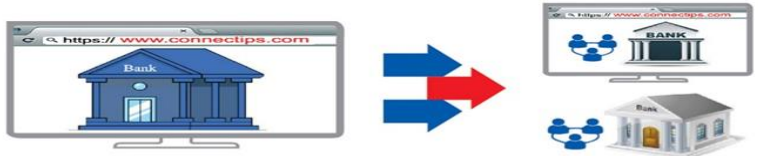

3. Verify From Bank

- Download गरिएको फारम र आफ्नो परिचयपत्र (परिचय खुल्ने र बैंकलाई मान्य हुने) सहित आफ्नो बैंकमा जाने ।
- फारममा उल्लेखित आफ्नो खाता बैंकबाट एक पटक Verify गराउने ।

www.connectips.com

Product of Nepal Clearing House Limited (NCHL)

connect IPS
pay direct from bank




आफ्नो बैंक खाताबाट कुनै पनि सदस्य बैंक/वित्तीय संस्थामा रहेको खातामा सोझै फण्ड ट्रान्सफर गर्न *connect*IPS e-Payment प्रयोग गर्नुहोस् ।

## फण्ड ट्रान्सफर गर्न सकिने तरिकारहरू

**1. Own Account**

बैंक खाताबाट आफ्नो अन्य बैंक खातामा फण्ड ट्रान्सफर गर्न सकिने ।

**2. *connect*IPS User/ Mobile No.**

लाभग्राहीको *connect*IPS ID अथवा मोबाईल नं. को आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

**3. Bank Account**

लाभग्राहीको बैंक खाता विवरणको आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

**4. Favorite Account**

नियमित रुपमा कारोबार हुने लाभग्राहीको बैंक खाता अथवा *connect*IPS ID लाई एकपल्ट Favorite मा राखी उक्त List को आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

ECC Electronic Cheque Clearing
चेकबाट कारोबार गरौं

NEPAL CLEARING HOUSE

IPS Interbank Payment System
सरल भुक्तानीको माध्यम

**Nepal Clearing House Ltd. (NCHL)**
3rd Floor, Kamaladi Complex, Kamaladi, Kathmandu,
PO Box: 21400, Tel: +977-1-4255306, Fax: +977-1-4255309
E-mail: info@nchl.com.np, URL: www.nchl.com.np

# E-GOVERNMENT: WHAT IT IS NOT

- It is not only Computerizing the Existing Government Processes.
- It is not only digitizing the files and documents of the Government.
  - E-Government ≠ Just Technology
  - E-Government = Government
- **(Change management and Transformation) -** Change management is a systematic approach to dealing with the transition or transformation of an organization's goals, processes or technologies.

# What is NOT E-Government ?

e-Government is not about **'e'**

but about **government !**

e-Government is not about **computers & websites**

but about **citizens & businesses!**

e-Government is not about ***translating*** processes

but about ***transforming*** processes !

# What is E-Government?

- ***E-government*** has been defined as ***'the use of ICT to promote more efficient and effective government, facilitate more accessible government services, allow greater public access to information, and make government more accountable to citizens".***
- The resulting outputs can be:
  - less corruption,
  - increased transparency,
  - greater convenience,
  - revenue growth,
  - cost reductions etc.

# E-Government & E-Governance

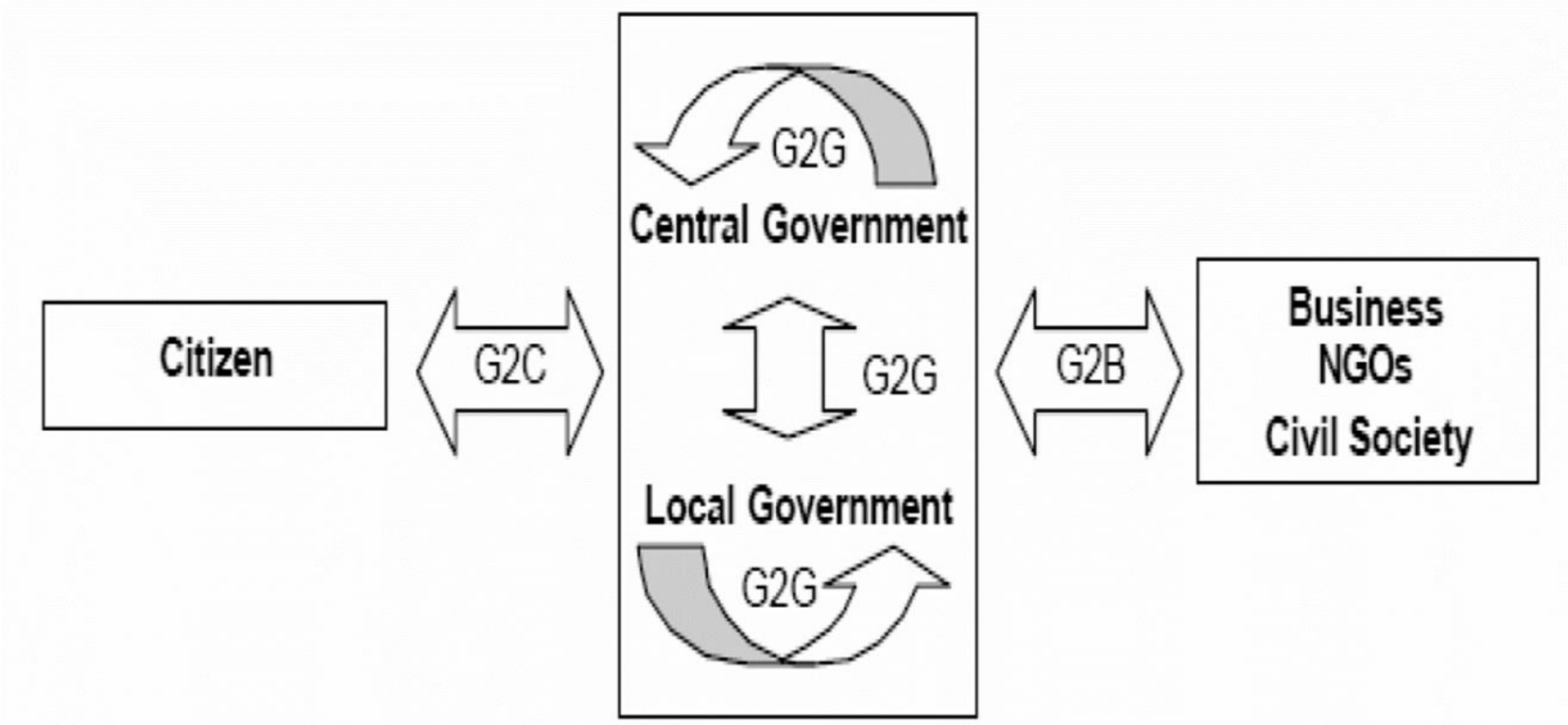
- **E-Government:**
  - Transformation of Government
  - Modernization of processes & functions
  - Better delivery mechanisms
  - Citizens are recipients
- **E-Governance:**
  - A decisional process
  - Use of ICT for wider participation of citizens
  - Citizens are participants

# Is E-Gov always based on Internet?

**NO!**

- The following forms are also **e-Government**:
  - Telephone, Fax, Mobile
  - CCTV, Tracking Systems, RFID, Biometrics
  - Smartcards
  - Non-online e-Voting
  - TV & Radio-based delivery of public services

# E-Governance Model / Types of E-GOV



# E-Governance Model (Contd.)

- The central ***E-Governance*** is to make government services ***efficient***, ***accessible*** and ***convenient***. It is the enhancement of current government and it also helps to provide better government services to the citizen. Hence, E-governance delivers ***SMART*** government.
  - **S** – Simple
  - **M** – Moral
  - **A** – Accessible
  - **RT** – Responsive and Transparent Government

# E-Governance Model (Contd.)

**Government-to-Citizen(G2C):**

- The ***Government to Citizen*** refers to the government services that are accessed by the familiar people. And most of the government services fall under G2C. Likewise, the primary goal of Government-to-citizen is to provide facilities to the citizen. It helps the ordinary people to reduce the time and cost to conduct a transaction. A citizen can have access to the services anytime from anywhere.

- Furthermore, many services like ***license renewals***, and ***paying tax*** are essential in G2C. Likewise, paying the administrative fee online is also possible due to G2C. The facility of Government-to-Citizen enables the ordinary citizen to ***overcome time limitation***. It also focuses on geographic land barriers.

# E-Governance Model (Contd.)

**Government-to-business (G2B):**

- The ***Government to Business*** is the exchange of services between Government and Business organizations. It is efficient for both government and business organizations. G2B provides access to relevant forms needed to comply. The G2B also consists of many services exchanged between business sectors and government.

- Similarly, the Government to business provides timely business information. A business organization can have easy and convenient online access to government agencies. G2B plays a crucial role in business development. It enhances the efficiency and quality of communication and transparency of government projects.

# E-Governance Model (Contd.)

**Government-to-Government (G2G):**

- The ***Government to Government*** refers to the interaction between different government department, organizations, and agencies. This increases the efficiency of government processes. In G2G, government agencies can share the ***same database*** using online communication. The government departments can work together. This service can increase international diplomacy and relations.

- In conclusion, G2G services can be at the local level or the international level. It can communicate with global government and local government as well. Likewise, it provides safe and ***secure inter-relationship between domestic or foreign government***. G2G constructs a ***universal database*** for all member states to enhance service.

# E-Governance Model (Contd.)

**Government-to-Employee (G2E):**

- The ***Government to Employee*** is the internal part of G2G sector. Furthermore, G2E aims to bring employees together and improvise knowledge sharing.

- Similarly, G2E provides online facilities to the employees. Likewise, ***applying for leave***, ***reviewing salary payment record***, ***checking the balance of holiday*** etc. The G2E sector provides ***human resource training and development***. So, G2E is also the relationship between employees, government institutions, and their management.

# Key Applications of Existing E-GOV Systems

- Vehicle Registration **(G2C)** – Transfer of Ownership, Blue Book Renewal
- Pollution checking, driving license test and issuance **(G2C)**
- Vital Event Registration System **(G2C)**
- Computerized Citizen Card Distribution System **(G2C)**
- Registration of Cottage and Small Industries **(G2B)**
- E-Procurement **(G2B)**
- Company Registration **(G2B)**
- E - Postal service **(G2C)**
- E – Attendance **(G2E)**
- Online Performance Tracking System **(G2G)**

# Key Applications of Existing E-GOV Systems (Contd.)

- Government Accounting system - Disbursement Centers **(G2G)**
- Personnel Management System (Civil Service Records) **(G2G)**
- E-HMIS ( Ministry of Health) **(G2G)**
- Revenue **(G2B)**
  - E-VAT (Integration with e-Gov umbrella) **(G2B)**
  - E-PAN (Integration with e-Gov umbrella) **(G2B)**
  - E-Filing (Integration with e-Gov umbrella) **(G2B)**
  - E-TDS (Integration with e-Gov umbrella) **(G2B)**

# Goal of E-Government

- Better Service Delivery to Citizens
- Improved Services for Business
- Transparency & Anti-corruption
- Empowerment through Information
- Efficient Government Purchasing

# Benefits to Business

- Increased velocity of business
- Ease of doing business with Government
  - e-Procurement
- Better Investment climate
- Transparency

# Benefits to Citizens

- Cost and time-savings
- Certainty in getting services
- Better quality of life
- Ease of access of information
- Added convenience – multiple delivery channels
- Possibility of self-service

# Smart City

- A ***smart city*** is a designation given to a city that incorporates ***Information and Communication Technologies*** **(ICT)** to enhance the quality and performance of urban services such as energy, transportation and utilities in order to reduce resource consumption, wastage and overall costs.
- The aim of a smart city is to enhance the quality of living for its citizens through smart technology.
- Some major characteristics used to determine a city's smartness include:
  - a technology-based infrastructure;
  - environmental initiatives;
  - a high functioning public transportation system;
  - a confident sense of urban planning and
  - humans to live and work within the city and utilize its resources.

# How Smart City Works?

- Smart cities utilize their web of connected IoT devices (***smart fire alarms***, ***smart door locks***, ***smart bicycles***, ***smart watches*** etc.) and other technologies to achieve their goals of improving the quality of life and achieving economic growth.
- Successful smart cities follow four steps:
  - **Collection -** Smart sensors throughout the city gather data in real time.
  - **Analysis -** Data collected by the smart sensors is assessed in order to draw meaningful insights.
  - **Communication -** The insights that have been found in the analysis phase are communicated with decision makers through strong communication networks.
  - **Action -** Cities use the insights pulled from the data to create solutions, optimize operations and asset management and improve the quality of life for residents.

# Censorship and Privacy Issues

# Censorship

- Providing access to the internet at work might mean that employees misuse the internet during office hours. For instance, an employee might make purchases from various websites.
- Providing internet access at home might mean that children are exposed to information that parents might consider harmful.
- However, not providing access to the internet might exclude people from the benefits of the vast information on the internet. It might be better, then to filter the websites to ensure the right information is accessible to people such as children and employees.
- ***Censorship*** is the act of filtering and blocking content to monitoring and penalizing users who access certain information in the internet.
- The following is a list of the most common internet censorship technologies:
  - ***DNS Tampering***
  - ***IP Blocking***
  - ***Keyword Filtering***
  - ***Packet Filtering***

# Censorship (Contd.)

- **DNS Tampering:**

  It is the process of de-registering a domain that is hosting nefarious content. This makes the website invisible to the browsers of users seeking access the site because it prevents the translation of domain names to site IP addresses.

- **IP Blocking or IP Banning:**

  This is the technique of blacklisting certain IP addresses of websites that are providing offensive content. When we request access to a site, our request is monitored by surveillance computers, which check our request against a list of blacklisted IP addresses. If we are trying to reach one of these forbidden sites, the internet service provider will drop the connection, causing to fail.

# Censorship (Contd.)

- **Keyword Filtering:**

  IP blocking only blocks websites that are explicitly blacklisted. But if a government wanting to block all information on subject X, this can be a problem. Not only are there billions of websites, but new ones created all the time, making it nearly impossible to create a fully updated list of sites of forbidden content. For a more powerful censoring technique, governments may use keyword filtering. This mechanism scans the requested **U**niform **R**esource **L**ocator **(URL)** string for target words. If the URL includes forbidden terms, the connection will be reset.

- **Packet Filtering:**

  An even more fine-grained censoring strategy is packet filtering. IP address filtering can only block communication on the basis of where packets are going to or coming form. The process of ***deep packet inspection*** examines packet contents for ***banned keywords***. Communication identified as containing forbidden content can be disrupted by dropping the connection. Users may receive one of a number of error message on their browsers, none indicating explicitly that they are being censored.

# Censorship (Contd.)

- **Keyword filtering** is a process of blocking or allowing certain words or phrases in a text or message. It is commonly used to filter out unwanted content, such as spam or offensive language, in email or social media.

- **Packet filtering**, on the other hand, is a method of controlling network traffic by examining and filtering packets based on specific criteria, such as IP address, port number, or protocol. It is used to secure a network by blocking unwanted traffic, such as malicious packets or unapproved applications.

- In short, keyword filtering is **used to filter text**, while packet filtering is **used to filter network traffic**.

# Privacy Issues

- The internet is the quickest way to connect to the rest of the world, but it is also the least secure. When you choose to be online, you are putting your security at risk because the internet is full of scams and games.
- The majority of internet users are unconcerned about their online privacy and are unaware of the potential risks. Not only is your privacy jeopardized, but so is your safety, especially when you use the internet to perform important and private tasks such as ***online banking*** and ***sharing critical business files***.
- Online users are incredibly vulnerable to security threats, and there is a long list of issues associated with their safety.
- Here we are discussing only the major issues concerning online privacy:
  - ***Spying and Snooping***
  - ***Information Mishandling***
  - ***Location Tracking***

# Privacy Issues (Contd.)

- **Spying and Snooping:**

  When we are online, we are spied by a number of trackers for various purposes. Trackers keep a record of our search history and track all our online activities through various means. This provides them a clear picture of who we are and our interests, which is a breach of online privacy policy and makes us a public property. Most of the time, this tracking is for advertisement purposes only and it allows advertisers to show ads according to your taste and interests. But sometimes this information is used by cybercriminals to carry out unauthorized and illegal activities risking our online existence.

- **Information Mishandling:**

  There are various sites on the internet that need our personal information to get access to their services. These sites often store cookies and save our personal information and later use it for various purposes. Most of the time this information is not encrypted and can be accessed by anyone. This mishandling of personal information may lead to serious consequences. The modern trend of e-banking and e-business portals have multiplied the risks associated with online privacy. By sharing our bank details and crucial files on the internet, we are paving ways for burglars and making ourself vulnerable to cybercriminals.

# Privacy Issues (Contd.)

- **Location Tracking:**

  Most of the internet users proudly upload their social media posts highlighting their current location along with tagging friends and family members. It's fun and exciting to share our life events with friends and family, but this data does not remain restricted to our expected audience only. This same data is stored on the social media site we are using and stays there forever. Along with social media apps, Google maps and other apps also ask for our location and by turning on our location we are providing first hand information to the world about where exactly we are and what our next move is, which is certainly risky and insecure.

# THANK YOU!