

Chapter 5
Internet &
World wide web

Informatics Practices Class XII (As per CBSE Board)

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Internet & WWW

Internet

- In general sense we can say that internet is network of networks ,an example of wide area network(WAN).Means Internet is a **global network** of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.
- We can do all of this by connecting a computer to the Internet, which is also called **going online**. When someone says a computer is online, it's just another way of saying it's connected to the Internet.

Internet & WWW

Internet revolution

1969-70 – ARPANET sent text message using binary encoding and decoding.

1971- First email using @ notation

1983 – TCP/IP protocol invented and DNS was created

1989 - Tim Berners-Lee, a British scientist, invented the World Wide Web (WWW)

1990 – Tim Berner Lee created HTML, first static website for CERN

1993 – Static website was made public

1994 - Tim Berner Lee developed URL

1995 – Launching of amazon.com

1997 – Launching of google and yahoo search engine

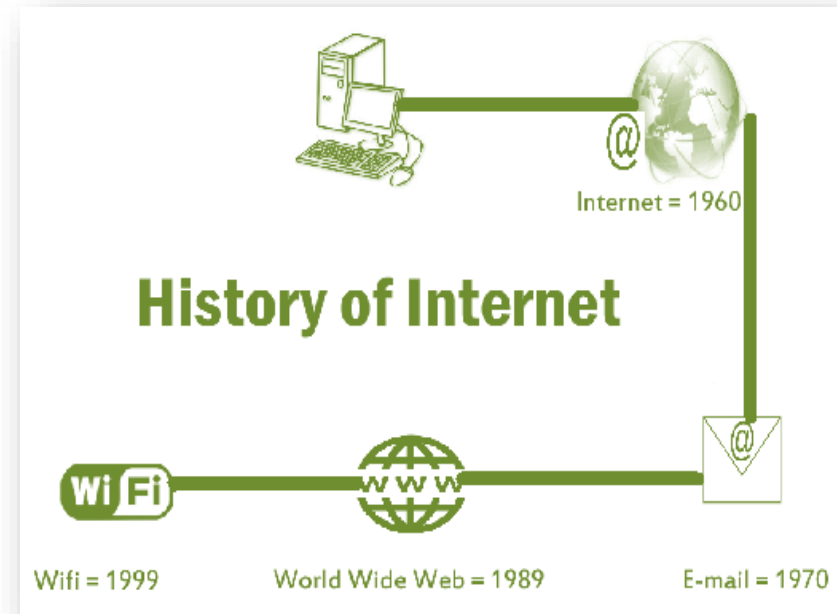
2004 – Launching of facebook

2007 – Launching of twitter

2009 – Launching of whatsapp

ARPANET (Advanced Research Projects Agency NETwork): In 1969, The US govt. formed an agency named ARPANET to connect computers at various universities and defense agencies. The main objective of ARPANET was to develop a network that could continue to function efficiently even in the event of a nuclear attack.

ARPANET adopted TCP/IP on January 1, 1983, and from there researchers began to assemble the “network of networks” that became the modern Internet. The online world then took on a more recognizable form in 1990, when computer scientist Tim Berners-Lee invented the World Wide Web.



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How does Internet works

Our computer or smartphone may be link to the internet using phone line/Mobile ISP(Internet Service Provider).Our computer may be part of LAN. Then LAN will be connected to ISP using a high speed phone line like T1 line(1.5mbps).where as normal phone line or modem typically handle 30000 to 50000 bits per second. ISPs then connect to larger ISP and the largest ISPs maintain fiber optic backbones for an entire region. Backbones around the world are connected through fiber optic lines, under sea cables or satellite links. In this manner every computer on internet is connected to every other computer on internet. So we can say that it is a kind of WAN ,working with the help of various networking devices and the protocols(specially TCP/IP) to forward data from source to destination devices without constraints of dissimilar devices and architecture.



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Some Internet Applications

- WWW/Web
- Email
- Chat
- VoIP



Internet & WWW

1. WWW /web -

Many people think that the **internet** and the **world wide web (WWW)** are the same thing. While they are closely linked, they are very different systems.

The internet is a huge network of computers all connected together. The world wide web ('www' or 'web' for short) is a collection of webpages found on this network of computers. Our web browser uses the internet to access the web.

The World Wide Web is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources.

World Wide Web was created by Timothy Berners Lee in 1989 at CERN in Geneva. World Wide Web came into existence as a proposal by him, to allow researchers to work together effectively and efficiently at CERN. Eventually it became World Wide Web.



Internet & WWW

The **World Wide Web** is a system of interlinked hypertext documents accessed via the Internet. With a web browser, one can view web pages that may contain text, images, videos and other multimedia and navigate between them via hyperlinks.

It use a protocol called HTTP – Hypertext Transfer Protocol
HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.



Internet & WWW

A Uniform Resource Locator, or URL is the address of a document we find on the WWW.

The elements in a URL:

Protocol://server's address/filename

Example:

`http://www.google.com/index.html`

Types of website:

- Static

- A static website is one that has web pages stored on the server in the format that is sent to a client web browser. It is primarily coded in Hypertext Markup Language (HTML)

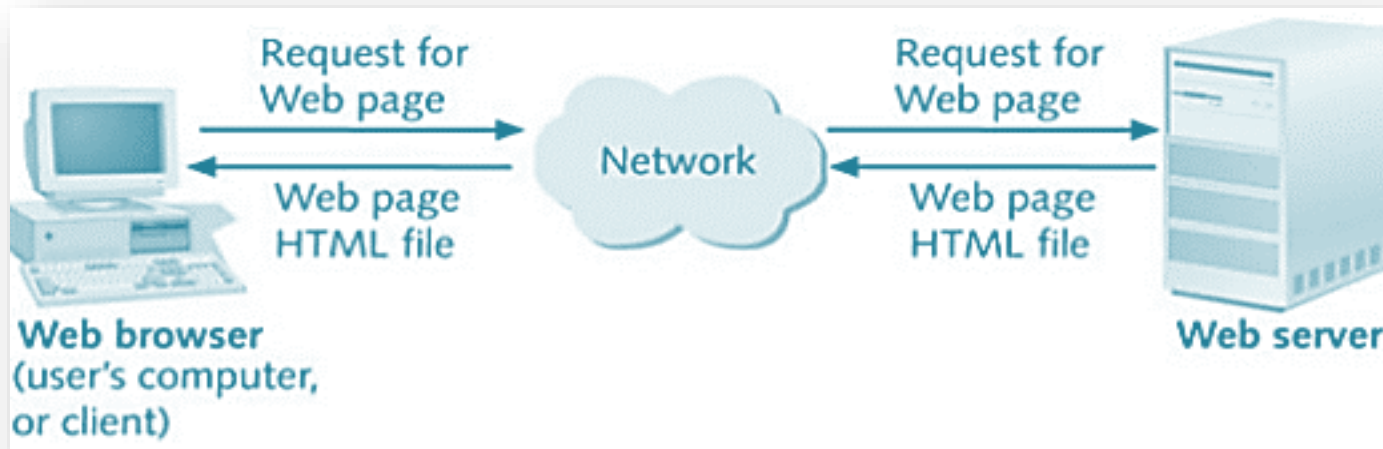
- Dynamic

- A dynamic website is one that changes or customizes itself frequently and automatically, based on certain criteria.



Internet & WWW

How does WWW works –

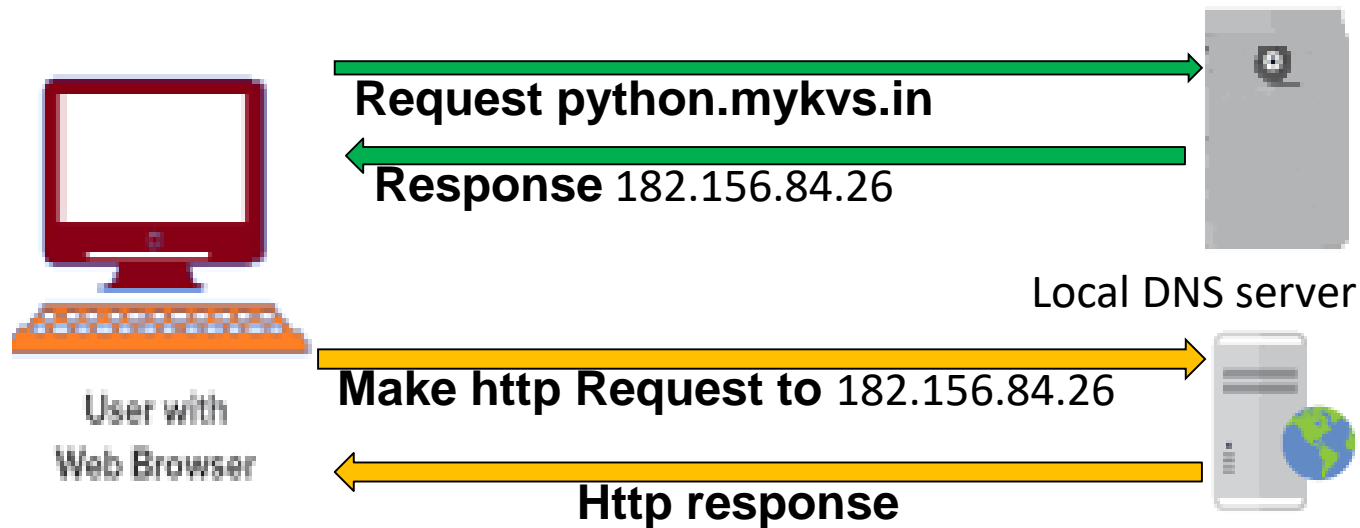


Web is a two – tiered architecture.

- A web browser display information contents
- Web server that transfers information to the client

Internet & WWW

DNS –The **Domain Name** System, translates human readable domain names (for example, `www.python.mykvs.in`) to machine readable IP addresses (for example, `182.156.84.26`). ... DNS servers translate requests for names into IP addresses.




A domain name is our website name. e.g. in `python.mykvs.in`, `in` is primary domain, `mykvs` is subdomain of `in` and `python` is subdomain of `mykvs`.

Generic domain name - `.com`, `.edu`, `.gov`, `.mil`, `.net`, `.org` etc

Country specific domain name - `.in` for india, `.us` for united states

Internet & WWW



URL –Uniform Resource Locator is defined as the global address of documents and other resources on the World Wide Web. The URL is an address that sends users to a specific resource online, such as a webpage, video or other document or resource.

e.g.

<http://python.mykvs.in/syllabus/cs12.pdf>

protocol subdomain domain name path

Is an IP address same as a URL or web address?

No. An IP address is a unique number that's assigned to each device on a network. On the World Wide Web, a domain name is assigned a unique IP address and when entered (e.g., computerhope.com), DNS translates it into an IP that routers use to find the web server. A domain name is used instead of an IP address because it's easier for humans to remember.



Internet & WWW

2. Email - Short for electronic mail, e-mail or email is information stored on a computer that is exchanged between two users over telecommunications. It is a fast and efficient way to communicate with friends or colleagues. we can communicate with one person at a time or thousands; we can receive and send files and other information.

Features of email

- ❖ Automatic/default reply to messages.
- ❖ auto-forward and redirection of messages.
- ❖ facility to send copies of a message to many people.
- ❖ automatic filing and retrieval of messages.
- ❖ addresses can be stored in an address book and retrieved instantly.
- ❖ notification if a message cannot be delivered.



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Basic email functions:

- send and receive mail messages
- save your messages in a file
- print mail messages
- reply to mail messages
- attach a file to a mail message



Email address

someone@mail server

- The email address has three parts:
 - a user name
 - an "at" sign (@)
 - the address of the user's mail server

• Example

feedback.mykvs@gmail.com

User name

mail server

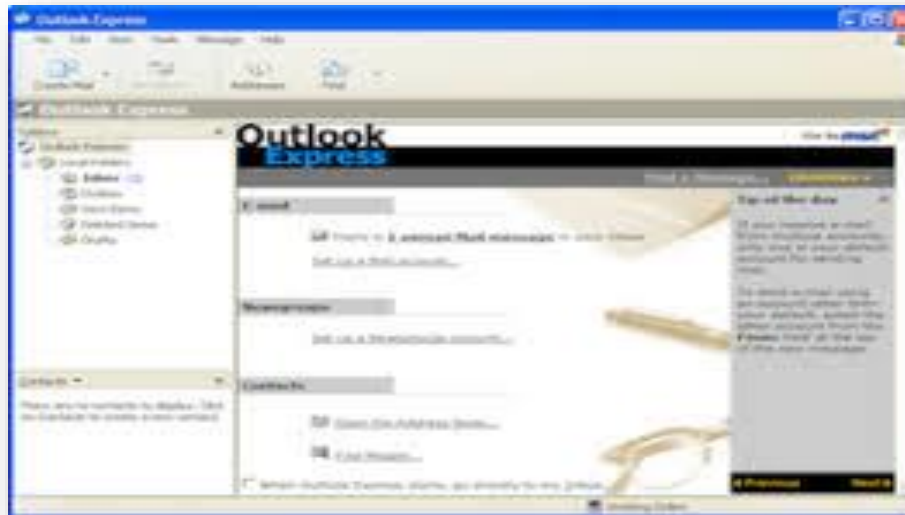
separator

Internet & WWW



Email Client

- An email client is a computer program used to manage a user's email.
- Popular email clients include Microsoft Outlook, Pegasus Mail, Mozilla's Thunderbird, and Apple Inc.'s Mail.



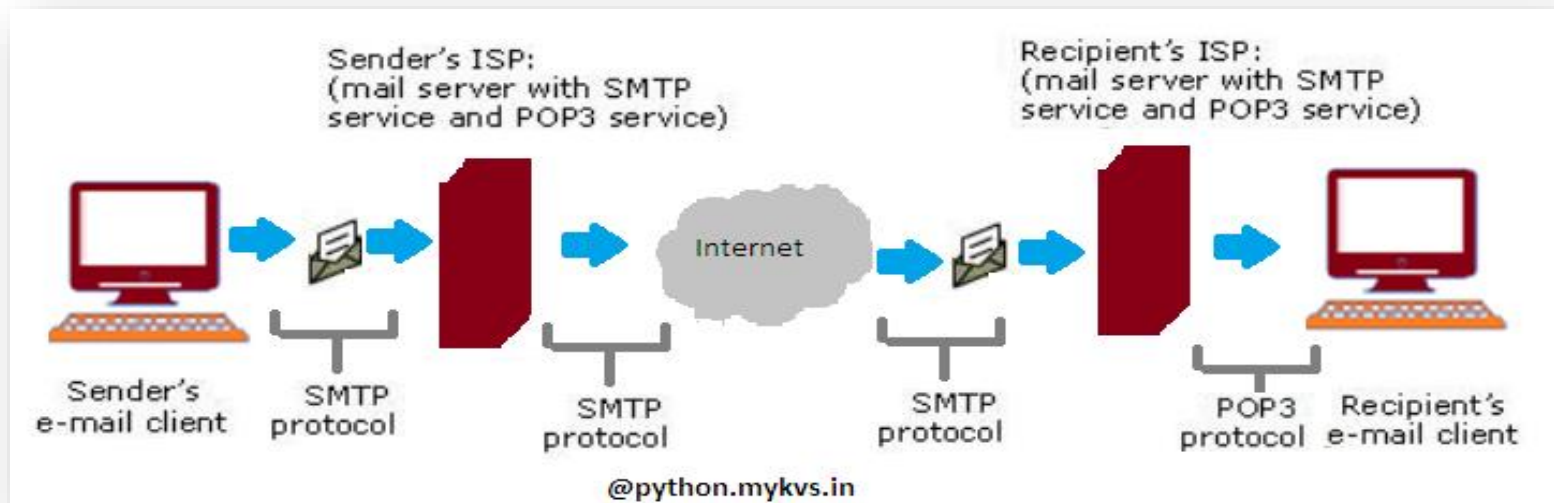


Web-based mail

- ❖ Is an e-mail service intended to be primarily accessed via a web browser.
- ❖ Very popular webmail providers:—
 - Gmail
 - Yahoo!
 - Hotmail
- ❖ Web mail is popular as it allows us to send or receive e-mail from anywhere.

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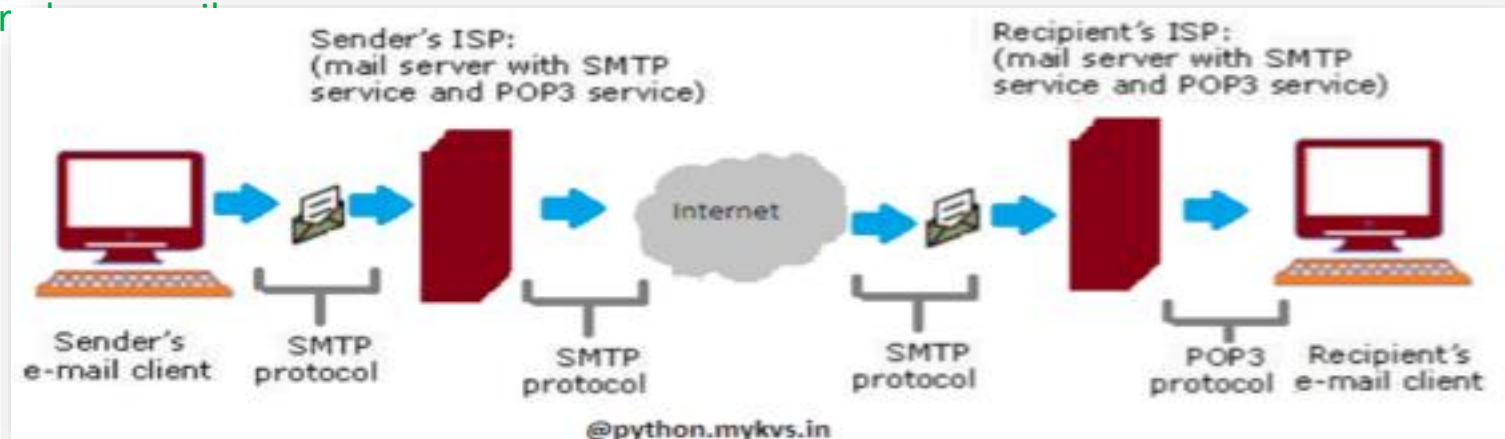
How Email works –Electronic mail is a facility that allows users to transmit messages across the internet in fast and secure manner.



Email created using email client program->on press of send button ,it is delivered to sender's mail server through **SMTP(Simple mail transfer protocol)**->which further transmit the same through internet to recipient's mail server->whenever recipient's email client program's inbox is opened,that email is delivered to inbox through **POP3 (post office protocols 3rd version)**->which user will read in email client program.

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SMTP – Most of the internet systems use SMTP as a method to transfer mail from one user to another. SMTP is a push protocol and is used to send the mail to email server. It is usually used with one of two other protocols, POP3 or IMAP, that let the user save messages in a server mailbox and download them periodically from the server. An alternative to SMTP that is widely used in Europe is X.400. Many mail servers now support Extended Simple Mail Transfer Protocol (ESMTP), which allows multimedia files to be delivered.



The SMTP model is of two types :

- End-to-end method
- Store-and-forward method

The end-to-end model is used to communicate between different organizations, whereas the store-and-forward method is used within an organization.



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POP3 – Post Office Protocol version 3 (POP3) is a standard mail protocol used to receive emails from a remote server to a local email client. POP3 allows us to download email messages on our local computer and read them even when we are offline. Note, that when we use POP3 to connect to our email account, messages are downloaded locally and removed from the email server. This means that if we access our account from multiple locations, that may not be the best option for us. On the other hand, if we use POP3, our messages are stored on our local computer, which reduces the space of email account uses on your web server.

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3. **Chat** – Chatting is the other method for Internet conversation. It enables people connected anywhere on the Internet to join in live discussions.

Chat sessions allow many users to join in the same free - form conversation, usually centered around a discussion topic.





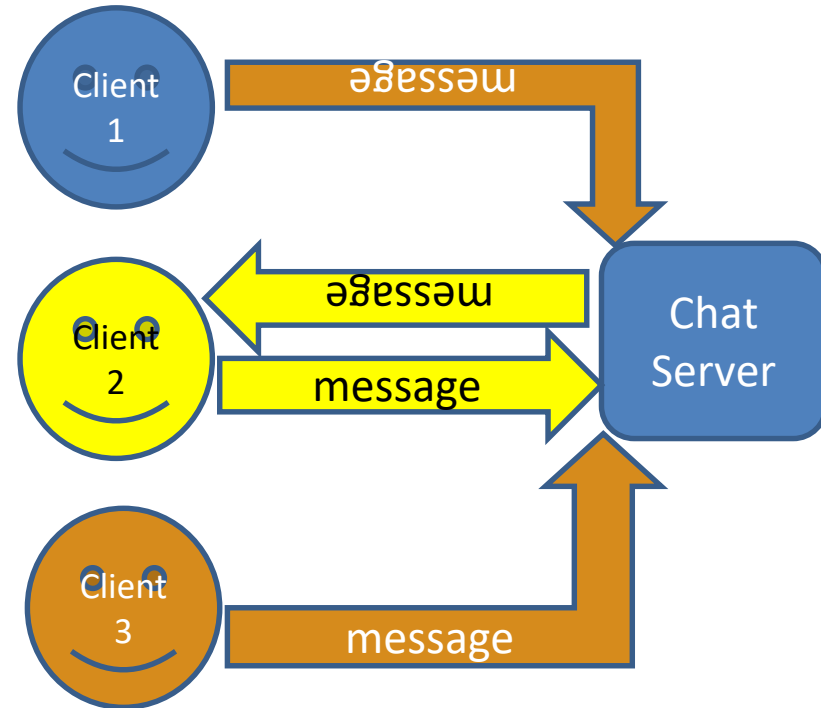
Chatting Software Examples:

- ❖ MSN Messenger
- ❖ Yahoo Messenger
- ❖ IRC
- ❖ Pidgin


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How chatting software works:

For each chat window a session is created at chat server to message send and receive among the clients of common window. Each session works as a thread at chat server. There may be multiple threads/chat session at chat server.



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4. VOIP – Voice over Internet Protocol (VoIP), is a technology that allows us to make voice calls using a broadband Internet connection instead of a regular (or analog) phone line. VoIP services convert our voice into a digital signal that travels over the Internet. If we are calling a regular phone number, the signal is converted to a regular telephone signal before it reaches the destination. VoIP can allow us to make a call directly from a computer, a special VoIP phone. In addition, wireless "hot spots" in locations such as airports, parks, and cafes allow us to connect to the Internet and may enable us to use VoIP service wirelessly.

Advantages:

- Less Cost
- Accessibility
- Flexibility
- Voice Quality
- Extra/Less Expensive Features

Disadvantages:

- Reliable Internet Connection Required
- Power Outages/Emergencies
- Latency

Who invented VoIP?

- **1994:** Two young Israeli computer scientists, Alon Cohen and Lior Haramaty, invent an audio transmitter-receiver that can send and receive voice data in real-time over the Internet.
- **1995:** Cohen and Haramaty's company, VocalTec, develops the first Internet telephone software (also known as a VoIP client).
- **1996:** The first versions of the VoIP call-signalling standards H.323 and SIP are published.
- **2002:** The final version of SIP is published as international standard RFC 3261.
- **2003:** Skype is launched.
- **2011:** Microsoft buys Skype for \$8.5 billion and its partner, Facebook, announces that it will incorporate Skype video calls into chats between Facebook friends. Skype announces 663 million registered users.
- **2014:** WhatsApp, the popular mobile messenger, announces a new version incorporating VoIP voice calling.
- **2016:** Skype announces that its mobile apps have been downloaded one billion times.



Services provided by VOIP – Phone to phone, pc to phone ,phone to pc,voice to email,ip phone,toll free number,call center applications,vpn,unified messaging etc.

Protocols used for VOIP are

- Session Initiation Protocol (SIP)- connection management protocol developed by the IETF
- H.323 - one of the first VoIP call signaling and control protocols that found widespread implementation.
- Real-time Transport Protocol (RTP)- transport protocol for real-time audio and video data
- Real-time Transport Control Protocol (RTCP)- sister protocol for RTP providing stream statistics and status information
- Secure Real-time Transport Protocol (SRTP) - encrypted version of RTP
- Session Description Protocol (SDP) - file format used principally by SIP to describe VoIP connections



Internet & WWW

How VoIP Works...

Once you initiate a VoIP call the following three scenarios takes place:

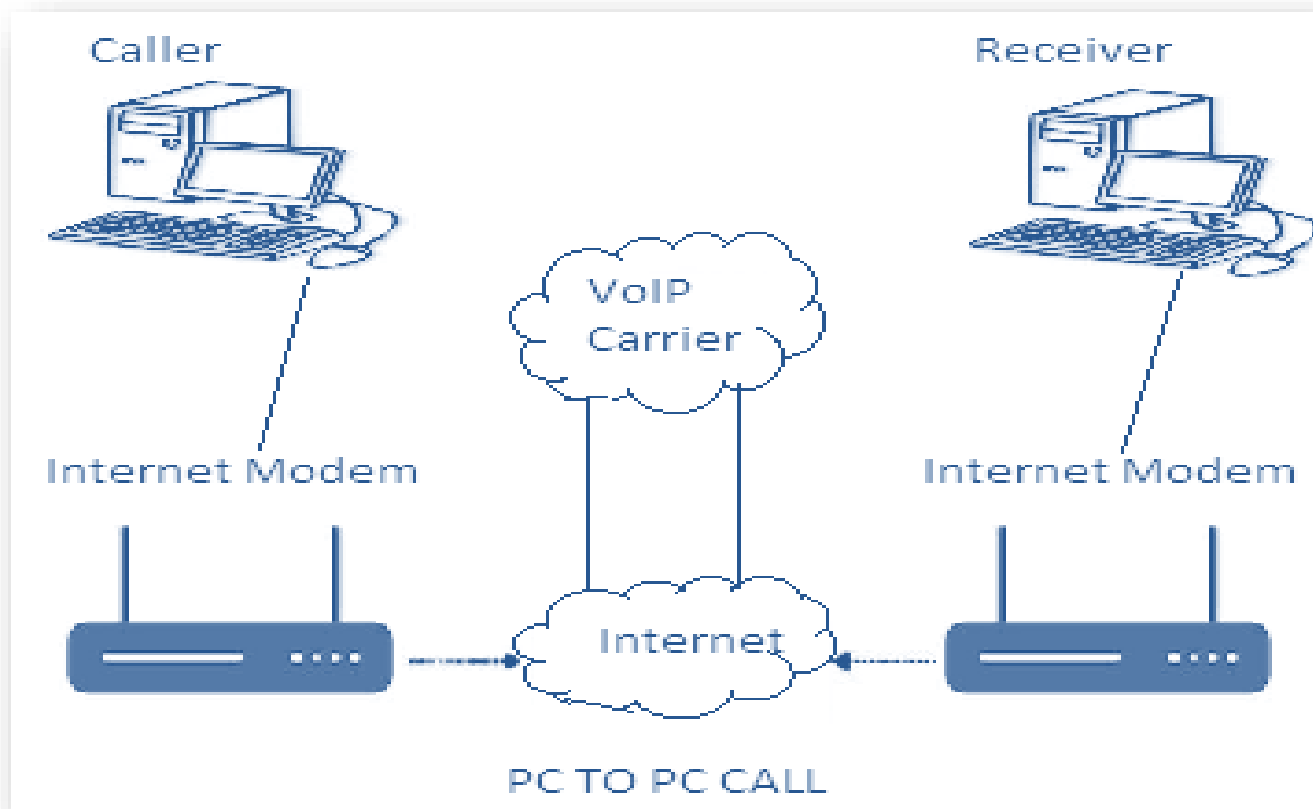
1. when we make a phone call - our voice signals are converted to digital packets
2. those packets travel via the Internet until they reach the final destination (called party)
3. at last the packets convert back to voice signals

During the above scenarios #2 and #3 here is what happens:

the originated call travels via the Internet to your provider's server / switch
our VoIP provider receives the call and bypasses it to a terminator i.e
another provider often a LEC (Local Exchange Carrier) at destination
the terminator receives the call and delivers it to our desired number
All the above happen at a twinkle-of-eye time speed that we don't even realize.

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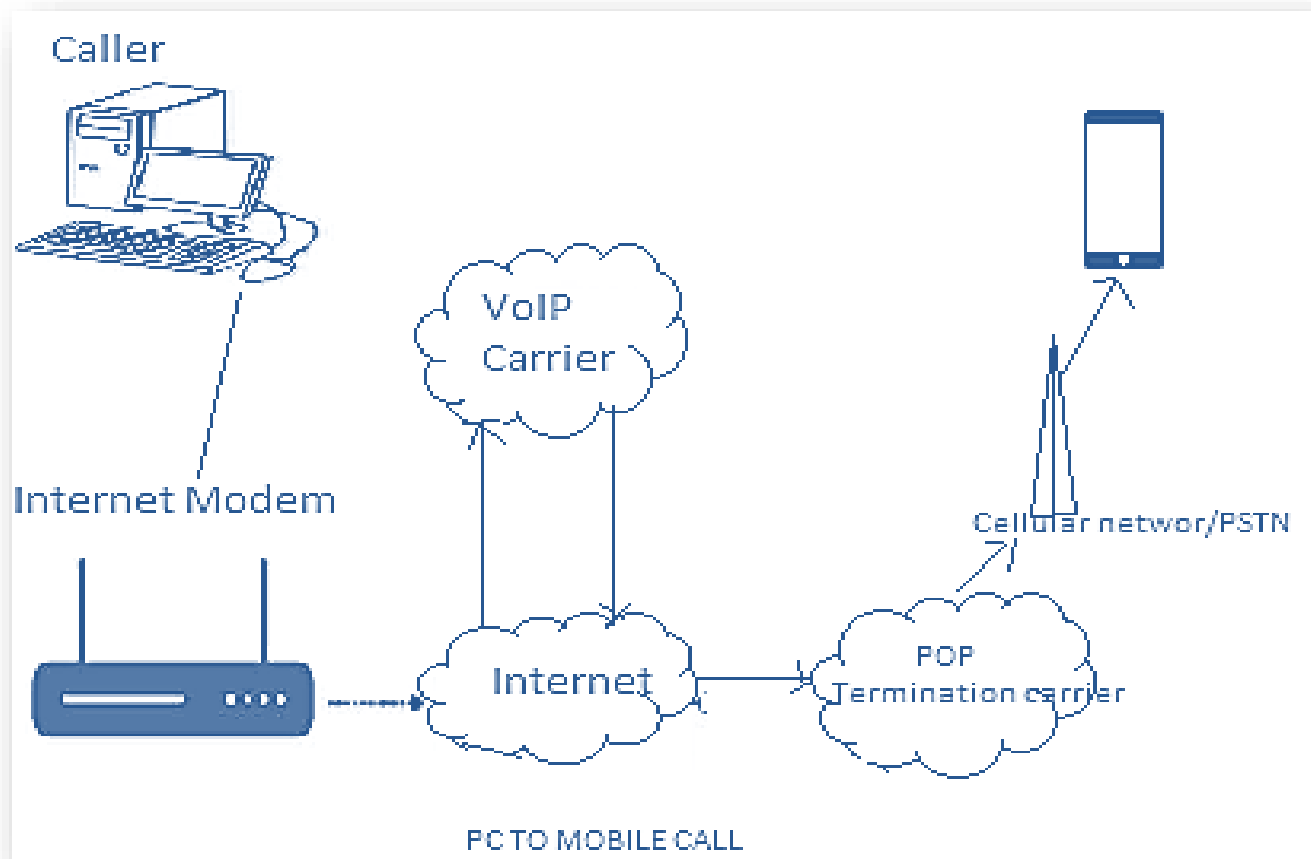
How VoIP Works... PC to PC CALL



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How VoIP Works... PC to MOBILE CALL





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Common examples of VoIP apps:

- ❖ Nextiva
- ❖ Aircall
- ❖ Zoiper
- ❖ Skype
- ❖ WhatsApp
- ❖ Google Hangouts
- ❖ Viber
- ❖ Facebook Messenger