UNIT-IV

1. Explain Advertising and Marketing on the Internet

Marketing on the Internet: Advertising on the Internet – Charting the On-Line Marketing Process

Advertising and Marketing on the Internet

- The new age of information-based marketing.
- Advertising on the internet.
- Marketing research. The New Age of Information-Based Marketing The new age of
- information-based marketing differentiate interactive marketing into four areas:
- Retailers vs manufacturers
- Target and micromarketing
- Small business vs large business

Regulatory and legal implications of cyberspace marketing. Retailers' vs Manufacturers:

- The role of Retailers and manufacturers are fast reversing in electronic commerce.

Retailer's vs Manufacturers have the fallowing methods:

- Market research and customer prospecting.
- Market presence method
- Product or services building method
- Information-based products pricing and priority method.

Target and Micromarketing:

- Electronic commerce, technology has put target and micromarketing within the research of small business.
- It gives information to the micro marketers not only about its own business but also consumer's information.
- Consumer target is two-way flow of communication between seller and buyer.
- Direct mail and telemarketing are two fast growing ways to micro market.
- Technology is an essential tool in micromarketing.

There are two main types of micromarketing:

- Direct-relationship micromarketing: is aimed at stimulating sales at retail establishments through direct contacts with consumers.
- Direct-order micromarketing: is focused on selling products directly to consumers in
- their homes or businesses.

Small vs large:

- Thread avoid vs goliath syndrome
- The key distinction between small and large business remains access to national and international marketing for advertising purposes.
- Today, exorbitant advertising cost represents the barrier to reaching the customer effectively. Internet and other networks plays good role in advertising.

- ☞ The major difference between the internet and other I-way advertising media are ownership and membership fees.
- ☞ Due to the empowering effect of internet-facilitated advertising however, the balance of power between large and small companies may change in future. Advertising on the Internet The notion of advertising and marketing became inevitable after 1991 when the internet was opened for commercial traffic.
- ☞ There are very good reasons for embracing the inevitability of growing of commercial advertising on the internet:
    - o Advertising conveys much needed information

Advertising generates significant revenue Key components for making internet advertising effectively are:

- o Advertising process
- o Core content
- o Supporting content
- o Market and consumer research
- o Repeat customers

On-line advertising paradigms:

Two different advertising paradigms are emerging in the on-line world, they are:

1. Active or push-based advertising
2. Passive or pull-based advertising

Active or push-based advertising: Active or push-based advertising is of two types they are:

The broadcast model:

- ☞ Broadcasting message provides a means for reaching a great number of people in short period of time. It mimics the traditional model, in which customer id exposed to the advertisement during TV programming.
- ☞ It basically uses direct mail, spot television, cable television.
- ☞ Text-based broadcast messages also used in advertising in Usenet news groups.

The junk mail model:

- ☞ Disadvantage of the direct mail include relatively high cost per contact.
- ☞ Junk mail is the just poorly targeted direct mail.
- ☞ It is most intrusive of all forms of internet advertising, because it is easily implemented
- ☞ using electronic mail.
- ☞ Junk mail creates unwanted expense
- ☞ Passive or pull-based advertising
- ☞ Pull-based advertising provide a feedback loop, company and customers

2. Explain Charting the On-Line Marketing Process

Contrary to the hype, marketing on the Internet is neither as easy nor as straightforward as it appears at first glance. Understanding how this process works can help to unravel the

"mystery" of Internet marketing. It includes creating a marketing plan, distributing an advertisement and interacting with customers in a clear step by- step manner.

Marketing strategy for new product introduction

- The unique characteristics of the Internet environment can assist in this monumental task.

Adaptation of the new product introduction process to the internet

- These basic issues permeate the entire six-step interactive marketing process outlined in table1 and described in detail in the following sections.

Table1. Interactive Marketing Process on the Internet

Step 1	Segment and identify potential customers. Initial market research done by reaching relevant groups (Web servers, listservs, newsgroups).
Step 2	Create promotional, advertising and educational material. Web page with multimedia effects (audio and video). Product information and complementary products, order forms and questionnaires.
Step 3	Put material on customers' computer screens. Push-based marketing: direct marketing using newsgroups, listservs and e-mail. Pull-based marketing: indirect (static) marketing using Web pages.
Step 4	Interact with customers. Dialogue with the customer through interactive discussion about various features offering endorsements, testimonials, questions and answers.
Step 5	Learn from customers. (Repeat customers are 80 percent of the customer base.) Incorporate feedback from customers in advertising and marketing strategy. Identify new markets, using experience in new product development.
Step 6	Provide online customer service.

Advertising types:

Interactive Advertising

Traditional advertising copy tends to be linear in nature and typically assigns the customer a passive role. *Interactive advertising*, in which the customer has control over what he or she sees, is known as nonlinear advertising and is made possible through the use of hypermedia that allow the reader to click on specially highlighted items to immediately access more information.

Content-oriented Advertising

Interactivity alone is not enough. To support it, value-laden content is essential.

The Internet community appreciates quality information that adds value, since nothing is more obvious than empty promises. So do not expect product advertising alone to be

sufficient. To support content-oriented marketing, companies often publish or mail electronic newsletters that report relevant innovations or news. This way, each customer can quickly learn about and assess the comparative advantages of various products in the news.

3. Explain E-commerce Catalogs or Directories

Directories perform an essential support function that guides customers in amaze of options by enabling the organization of the information space. Finding things (users, resources, data, or applications) in a distributed network is the task of the directory service. Directories inform a potential customer or software agent about available services, provides, prices, quality, and other important characteristics necessary for making purchasing decisions.

1.Electronic White pages:

Whitepages is a provider of contact information for people and businesses. It also develops mobile apps and business services that make use of its contact data. It has the largest database available of contact information on US and Canada residents, which is used for services by USPS and MSN, among others. The company's revenue comes primarily from advertising.

2.Electronic Yellow pages:

These are online versions of traditional printed business directories produced by telephone companies around the world. Typical functionalities of online yellow pages include me, business or location. Since Electronic Yellow Pages are not limited by space considerations, the alphabetical listings of businesses and search functionality of the business database by nathey often contain far more comprehensive business information such as vicinity maps, company profiles, product information, and more.

An advantage of Electronic Yellow Pages is that they can be updated in real time; therefore, listed businesses are not constrained by once-a-year publishing of the printed version which leads to greater accuracy of the listings since contact information may change at any time.

An ecommerce catalog is commonly defined as any online catalog that showcases the products or services of a company that operates primarily online, or in "e-commerce."

This catalog represents part of a general shift in the way the world's consumer base does business. A large amount of what used to take place in physical stores now happens online. Just as physical or "brick and mortar" stores have migrated to the internet, many of their catalogs have moved from print to online formats.

There are many different types of ecommerce catalog setup options for businesses to choose from. One of the popular high-tech options is an "online shopping cart" – this kind of technology provides for full-featured online shopping, where software helps web users select products, compare prices, and order, all online. Other ecommerce catalog setups are less functional, but still display the full range of products. Some ecatalogs use phone support as a backup service for sales.

Content Marketing through specialized Directories from Filterpedia are the perfect option for businesses looking to raise their profile, find new customers and increase market share. With today's Marketplace constantly evolving, consumers face more choices than ever before, it's imperative to have a strong presence across all search platforms

4. Explain Information Filtering

Information filtering describes a variety of processes involving the delivery of information to people who need it. This technology is needed as the rapid accumulation of information in electronic databases makes it imperative that consumers and organizations rely on computing methods to filter and disseminate information.

Although this term is appearing quit often in articles describing applications such as electronic mail, multimedia distributed system, And electronic office documents, the distinction between filtering and related search processes such as retrieval, routing, categorization, and extraction is often to not clear.

An abundant amount of information is created and delivered over electronic media. Users risk becoming overwhelmed by the flow of information, and they lack adequate tools to help them manage the situation. Information filtering (IF) is one of the methods that is rapidly evolving to manage large information flows. The aim of IF is to expose users to only information that is relevant to them.

Many IF systems have been developed in recent years for various application domains.

Some examples of filtering applications are:

Filters for search results on the internet that are employed in the Internet software, personal e-mail filters based on personal profiles, listservers or newsgroups filters for groups or individuals, browser filters that block non-valuable information, filters designed to give children access them only to suitable pages, filters for e-commerce applications that address products and promotions to potential customers only, and many more.

The different systems use various methods, concepts, and techniques from diverse research areas like: Information Retrieval, Artificial Intelligence, or Behavioral Science.

Various systems cover different scope, have divergent functionality, and various platforms.

There are many systems of widely varying philosophies, but all share the goal of automatically directing the most valuable information to users in accordance with their User Model, and of helping them use their limited reading time most optimally.

5. Explain Consumer-Data Interface: Emerging Tools

Many of the electronic commerce applications require complex interfacing between humans and vast information resources. These applications must understand their environment and react to it. High-level user interfaces are needed to satisfy the many requirements and preferences of vast numbers of consumers in the online marketplace.

Consumer data interfaces can be broadly classified into the following categories:

Human computer interface

- A broad range of integrated technologies will allow humans and computers to interact effectively and naturally.
- Technologies will be developed for speech recognition and generation; graphical user interfaces will allow rapid browsing of large quantities of data; user sensitive interfaces will customize and present information for particular levels of understanding.

Heterogeneous database interfaces

- Methods to integrate and access multiple structure databases composed of multi formatted data will be developed. In a future I-way environment, a user could issue a query that is broadcast to appropriate databases and would receive a timely response translated into the context of the query.
- Examples of multi formatted data include plain text, data that are multicolumn such as spreadsheets, and complex data types such as video.

User–Centered design tools/systems

- New models and methods that lead to interactive tools and software systems for architecture or such as design will be developed.

Virtual reality and telepresents

- Tools and methods for creating synthetic (virtual) environments to allow real-time, interactive human participation in the computing/communication loop will be addressed.
- The basic infrastructure necessary for consumer interface experimentation is available in terms of the WWW and the Mosaic browser. The latter is the basis of a "universal" interface that can be used to access diverse distributed information databases and resources.

UNIT-V

1. Multimedia and Digital Video: Concepts

Multimedia concepts

Multimedia: the use of digital data in more than one format, such as the combination of text, audio and image data in a computer file.

The theory behind multimedia is digitizing traditional media like words, sounds, motion and mixing them together with elements of database.

Multimedia data compression:

Data compression attempts to pack as much information as possible into a given amount of storage. The range of compression is 2:1 to 200:1.

Compression Methods:

- **Sector-oriented disk compression** (integrated into the operating system, this compression is invisible to end user)
- **Backup or archive-oriented compression**(Compress file before they are downloaded over telephone lines)
- **Graphic & video-oriented compression**(Compress graphics & video file before they are downloaded)
- **Compression of data being transmitted over low-speed network** (tech used in modems, routers)

Data compression in action:

- Data compression works by eliminating redundancy.
- In general a block of text data containing 1000 bits may have an underlying information
  content of 100 bits, remaining is the white space.
- The goal of compression is to make the size of the 1000-bit to 100-bit (size of underlying
  information).this is also applicable to audio and video files also.

Compression Techniques:

- Compression techniques can be divided into two major categories:

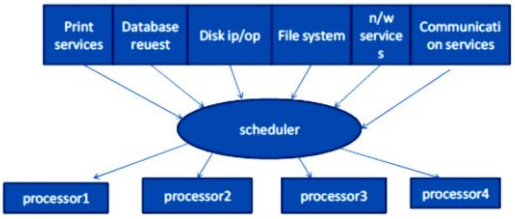
Lossy:

- Lossy compression means that it given a set of data will undergo a loss of accuracy or resolution after a cycle of compression and decompression. it is mainly used for voice, audio and video data.
- The two popular standards for lossy tech is MPEG, JPEG.

Lossless:

- Lossless compression produces compressed output that is same as the input. It is mainly
  used for text and numerical data.

Symmetric Multiprocessing



E-Commerce

Multimedia Server:

- A server is h/w & s/w systems that turns raw data into usable information and provide that to users when they needed.
- E-commerce application will require a server to manage application tasks, storage, security, transaction management and scalability.

To manage multimedia information we need the fallowing.

Multiprocessing:

- Current execution of several tasks on multiple processors. this implies that the ability to use more than one CPU for executing programs. processors can be tightly or loosely coupled.

Symmetric multiprocessing:

- Symmetric multiprocessing treats all processors as equal I.e. any processor can do the work of any other processor. It dynamically assigns work to any processor.

Multitasking:

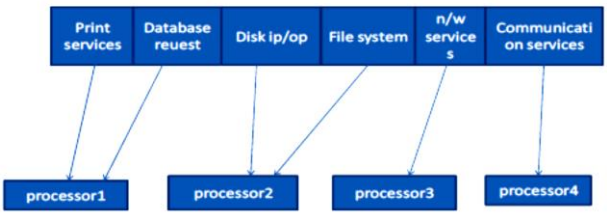
- Multitasking means that the server operating systems can run multiple programs and give the illustration that they are running simultaneously by switching control between them.

- Two types of multitasking are:
    1. Preemptive
    2. Non preemptive

Multithreading:

- Multithreading is a sophisticated form of multitasking and refer to the ability to support separate paths of execution within a single address space.
- In this a process broken into independent executable tasks called threads

Asymmetric Multiprocessing



E-Commerce

Multimedia Storage Technology

- Storage technology is becoming a key player in electronic commerce because the storage
  requirements of modern-day information are enormous.
- Storage technology can be divided into two types:
  1. Network-based (disk arrays)
  2. Desktop-based (CD-ROM)
- Disk arrays store enormous amounts of information and are becoming an important storage technologies for firewall servers and large servers.
- Range provided for small arrays is 5-10 gigabytes.
- Range provided for large arrays is 50-500 gigabytes
- Technology behind disk array is RAID(redundant array of inexpensive disk)
- RAID offers a high degree of data capacity, availability, and redundancy.
- Current RAIDs use multiple 51/2 –inch disks.

CD-ROM:

CD-ROM is premiere desktop stop storage.

- It is a read only memory, to read CD-ROM a special drive CD-ROM drive is required.
- The mail advantage is the incredible storage density.
- That allows a single cd-rom disc contains 530MB for audio CD.
- That allows a single cd-rom disc contains 4.8 GB for video CD.

CD-ROM Technology Exhibits The Following:

High information density:

- It is with optical encoding, the CD can contain some 600-800 MB of data.

Low unit cost:

- Unit cost in large quantities is less than two dollars, because CDs are manufactured by well-developed process.

Read only memory:

- CD-ROM is read only memory so it cannot be written or erased.

Modest random access performance:

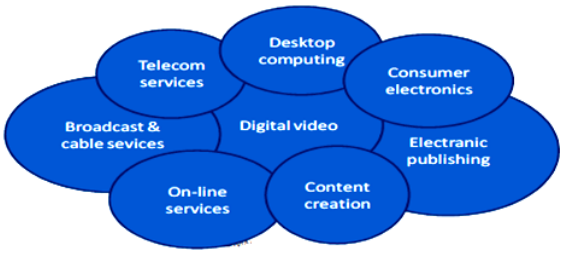
- Performance of the CDs is better than floppies because of optical encoding methods.

The Process of CD proceeds as follows:

- CD-ROM spiral surface contains shallow depressions called **pits.** These pits used to scatter light.
- CD-ROM spiral surface contains spaces between indentations called **lands** .these lands are used to reflect light.
- The laser projects a beam of light, which is focused by the focusing coils.
- The laser beam penetrates a protective layer of plastic & strikes the reflective aluminum layer on the surfaces
- Light striking a land reflects back to the detector.
- Light pulses are translated into small electrical voltage to generate 0's & 1's.

2. Digital Video and Ecommerce

- Digital video is binary data that represents a sequence of frames, each representing one image.
- The frames must be shown at about 30 updates per sec.
- Digital video as a core element:



Characteristics of Digital Video:

Several Characteristics of digital video differentiate it from traditional analog video.

- It can be manipulated, transmitted and reproduced with no discernible image generation.
- It allows more flexible routing packet switching technology.
- Development of digital video compression technology has enabled the of new applications in consumer electronics, multimedia computers and communications market.
- It poses interesting technical challenges; they are constant rate and continuous time media instead of text, image, audio and video.
- Compression rate are 10 mb /min of video.

Digital video compression/decompression:

- Digital video compression takes the advantage of the fact that a substantial amount of redundancies exist in video. The hour-longer video that would require 100 CDs would only required one CD if video is compressed.
- The process of compression & decompression is commonly referred to as just compression, but it involves both processes.
- Decompression is inextensible because once compressed, a digital video can be stored and decompressed many time.
- The adaptations of international standards are called codec.
- Mostly used codec today's are loss compression.

Types of Codec's:

- Most codec schemes can be categorized into two types:
  1. Hybrid
  2. Software-based.

Hybrid: hybrid codec use combination of dedicated processors and software. It requires specialised add-on hardware.

Best examples of hybrid codec are

- MPEG (moving picture expert group)
- JPEG(joint photographic expert group)

MPEG (moving picture expert group):

- Moving Picture Expert Group is an ISO group; the purpose of this is to generate high quality compression of digital videos.

MPEG I (Moving Picture Expert Group I):

- MPEG I defines a bit steam for compressed video and audio optimized to a bandwidth of
  1.5 Mbps, it is the data rate of audio CDs & DATs.
- The standard consists of three parts audio, video, and systems. A system allows the synchronization of video & audio.
- MPEG I implemented in commercial chips .resolution of the frames in MPEG I is 352X240 pixels at 30 frames per second.
- The video compression ratio for this is 26:1

MPEG II (Moving Picture Expert Group II):

- MPEG II specifies compression signals for broadcast-quality video. It defines a bit steam for high-quality "entertainment-level" digital video.
- MPEG-2 supports transmission range of about 2-15 Mbps over cable, satellite and other transmission channels.
- The standard consists of three parts audio, video, and systems. A system allows the synchronization of video & audio.
- MPEG II implemented in commercial chips.
- Resolution of the frames in MPEG I is 720X480 pixels at60 frames per second.
- A data rate of the MPEG-2 is 4 to 8 Mbps.
- Future promising of this is rapid evolution of cable TV's news channels.
- Two other MPEG standards are
  MPEG-3(1920X1080 and data rates are 20 to 40)
  MPEG-4(consisting of speech and video synthesis)

JPEG (Joint Photographic Expert Group):

- JPEG is a still-image compression algorithm defined by the joint photographic expert group and serves as the foundation for digital video.
- JPEG is used in two ways in digital video world:
  1. as apart of MPEG
  2. as motion JPEG
- JPEG standard has been widely adopted for video sequences.
- JPEG compression is fast and can capture full-screen, full-rate video.
- JPEG was designed for compressing either full-color or gray-scale Digital images of real world scenes.
- JPEG is a highly sophisticated technique that uses three steps:

The first step, a technique known as DCT (discrete cosine transformation).

Next, a process called quantization manipulates the data and compresses strings of identical pixels by run length encoding method.

Finally, the image is compressed using a variant of Huffman encoding.

- A use full property of the JPEG is the degree of looseness.

3. Video Conferencing

- Video on the desktop is a key element in turning a computer into a true multimedia platform.
- PC has steadily become a highly suitable platform for video.
- DESKTOP VIDEO PROCESSING includes upgrade kits, sound cards, video playback accelerator board, video capture hardware and editing software.
- Microphones, speakers, joystick, and other peripherals are also needed

Desktop video hardware for playback and capture:

- Desktop video require a substantial amounts of disk space and considerable CPU horsepower.
- It also requires specialized hardware to digitize and compress the incoming analog signal
- from video tapes.
- The two lines of video playback products become available in the marketplace I.e. video
- ASIC chips and board level products.

Video playback:

- The two lines of video playback products become available in the marketplace I.e. video
  ASIC chips and board level products.
- Broadly speaking, two types of accelerator boards are available:
  - Video
  - Graphics

Video capture and editing:

- Video capture board are essential for digitizing incoming video for use in multimedia presentations or video conferencing
- Video capture program also include video-editing functions that allows users crop, resize
  and converts formats and add special effects for both audio and video like fade-in, Embosses, zooma and echo's.
- Developers are crating next generation editing tools to meet business presenters and video enthusiasts.
- The best graphical editing tools make complex procedures accessible even to novice users.

Desktop video application software:

- The text that appear in the movie. Any PC wants to handle digital video must have a digital-video engine available.
- Two significant digital video engines are :
  1. Apple's QuickTime
  2. Microsoft's video for windows
- These two are software's only; they don't need any special hardware.
- QuickTime is a set of software programs from apple that allows the operating system to pay motion video sequences on a PC without specialized hardware.
- QuickTime has it s own set of compression/decompression drivers.

- Apple's QuickTime was the first widely available desktop video technology to treat video as a standard data type.
- In this video data could not be cut, copied, and pasted like text in a page composition program.
- Apple's QuickTime movie can have multiple sound tracks and multiple video tracks.
- Apple's QuickTime engine also supports synchronize

Microsoft's video for windows:

- Microsoft's video for windows is a set of software programs from Microsoft that allows the operating system to pay motion video sequences on a PC without specialized hardware.
- Microsoft video for windows has its own set of compression/decompression drivers.
- Microsoft chooses a frame-based model, in contrast to QuickTime-based model

Desktop video conferencing

- Desktop video conferencing is gaining momentum as a communication tool. Face-to-face video conferences are already a common practice, allowing distant colleagues to communicate without the expense and inconvenience of traveling.
- Early video conferencing utilized costly equipment to provide room-based conferencing, but now it becoming fast due to desktop video conferencing in this we participated by sit at their own desks, in their own offices, and call up others using their PCs much like telephone.

The Economics:

- Three factors have made desktop video conferencing:
- Price: The price fallen from 500,000$ to 500-1000$
- Standards: standards allowing interoperable communications between machines from different vendors.
- Compression: It uses better and faster compression methods.

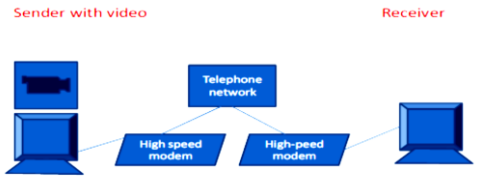
Types of desktop video conferencing:

- Desk top video conferencing system coming onto the market today are divided into Three types they are based on plain old telephone lines:
    1. POST
    2. ISDN
    3. Internet

Using POST for video conferencing:

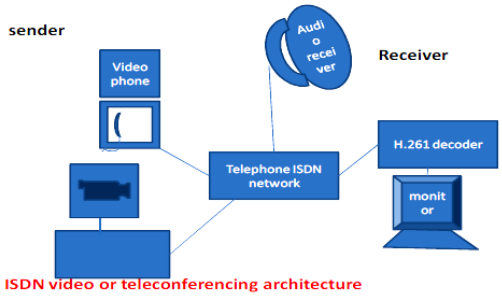
- POST systems are especially attractive for Point-to-Point conferencing because no additional monthly charges are assessed and special arrangements with the telephone company are unnecessary.
- The drawback with a POST solution is a restriction to the top speed of today's modems of 28.8 Kbps.
- It need a s/w ,once properly installing a s/w users allows to pipe video,audio,and data down a standard telephone line.

Point-to-Point video conferencing using POTS



Using ISDN for video conferencing:

- ISDN lines mostly offer considerable more bandwidth up to 128 Kbps, but it require the installation of special hardware.
- The use of ISDN has been restricted to companies especially in private residence.
- The fallowing fig explains the basic architecture for television or video conferencing using ISDN network transport switching.
- This architecture is commonly found in videophones. Networks required for video conferencing are fiber optic cable or analog POST.
- For video compression and decompression, the ISDN networks uses the H.261 technology, it is specified by the international telegraph and telephone consultative committee algorithm.



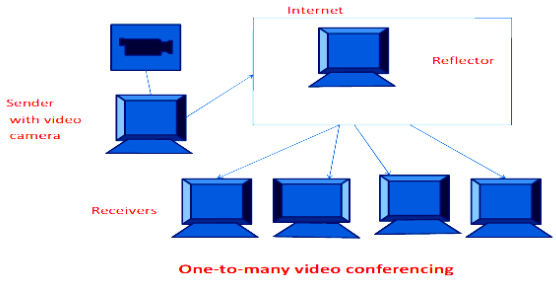
ISDN video or teleconferencing architecture

Using the Internet for Video Conferencing:

- The two video conferencing programs are available on the internet:
  1. CU- See Me
  2. MBONE

CU- See Me:

- CU- See Me is the first software available for the Macintosh to support real-time multiparty video conferencing on the internet.
- CU- See Me provides a one-to-one, one-to-many, several-to- several and several-to many conferencing depending on the user needs with minimal cost.



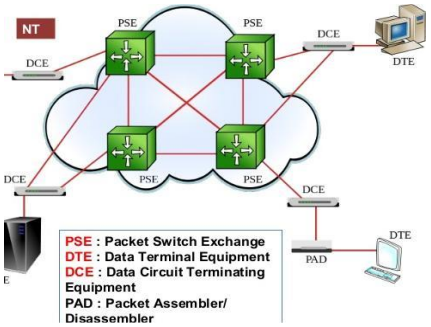
One-to-many video conferencing

4. Frame Relay

Definition:

- X.25 is a standard suite of protocols used for packet switching across computer networks. The X.25 protocols works at the physical, data link, and network layers (Layers 1 to 3) of the OSI model.
- While X.25 has, to a large extent, been replaced by less complex protocols, especially the Internet protocol (IP), the service is still used and available in niche and legacy applications.

X.25 Network



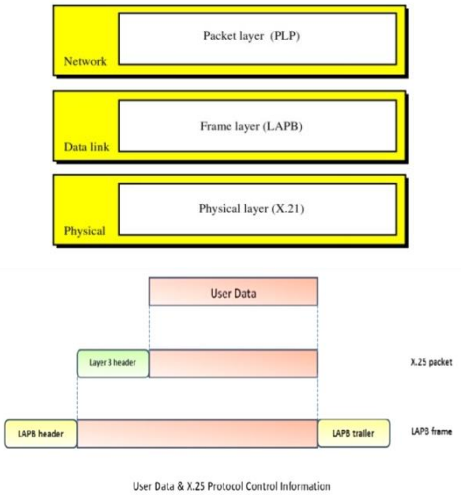
- It's a virtual-circuit switching network
- It uses a data transfer speed of 64 kbps
- It uses extensive error & flow controls at both data link & network layer
- X.25 defines how a packet-mode terminal can be connected to a packet network for exchange of data. It describes procedure necessary for establishing, maintaining & terminating connections.
- It also describes set of services, called facilities, to provide functions such as reverse charge, call direct & delay control
- X.25 is also known as a subscriber network interface (SNI) protocol.
- It defines how user's DTE communicates with the network & how packets are sent over that network using DCEs.
- It uses a virtual circuit approach to packet Switching (SVC & PVC) & use asynchronous (statistical) TDM to multiplex packets.

X.25 Layers

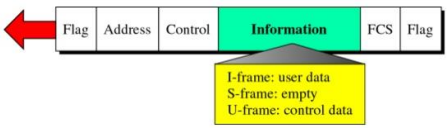
- X.25 protocol specifies three layers:
  1. Physical layer
  2. Frame layer
  3. Packet layer

- These layers define functions of physical layer, data link layer & network layer of OSI model.
- Given figure explains the situation

X.25 Layers in Relation to the OSI Layers



Format of a Frame



Frame Layer

- X.25 uses a bit oriented protocol at frame layer.
- This protocol is called as *Link Access Procedure, Balanced* (LAPB)
- LAPB is subset of *High-level Data Control (HDLC),* (which is bit oriented protocol used in point to point & multi point links)
- Figure shows general format of the LAPB packet

Frames are of three categories :

- I-frames are used to encapsulate PLP packets from the network layer.
- S-Frames : S-frames are for flow and error control in the frame layer.
- U-Frames : U-frames are used to set up and disconnect the links between a DTE and a DCE. The three packets most frequently used by LAPB in this category are
  - SABM (or ESABM if the extended address mode is used)
  - UA &
  - DISC

Frame Layer Phases

In the frame layer, communication between a DTE and a DCE involves three phases:

1. *link setup*
2. *packet transfer, and*
3. *link disconnect*

5. Cell Relay

Cell relay is data transmission service that uses transmission technology referred to as Asynchronous Transfer Mode (ATM). As the name suggests, the data transmission unit is a fixed length of data known as a cell. High-speed transmission compared to other services like frame relay is possible with the cell relay method. The cell relay is considered by most to be the transport service of the future.

Advantages

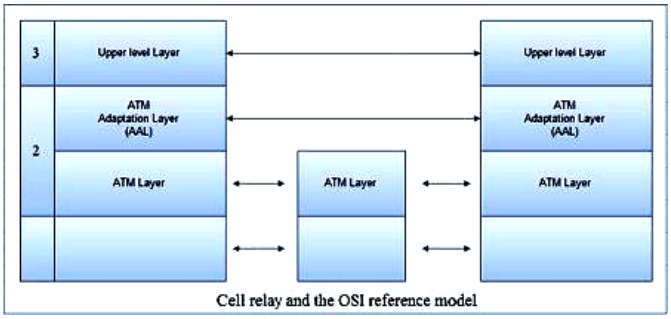
- **High-speed Transmission** The purpose of ATM is to provide high speed and low-delay switching networks to support any type of user traffic, such as voice, data or video applications.
- **Multiplexing Transmission** As in X.25 networks and frame relay, multiple channels can be set within one physical line and communication is possible with multiple parties simultaneously. ATM segments and multiplexes use traffic into small, fixed length units called cells to reduce and control delay. ATM can support different speeds, traffic types and quality of service matched to applications.

Disadvantages

- **Cell Discarding Occurs with Congestion** When congestion occurs in the network, the cells (data) within the network are discarded and retransmission control cannot be carried out within the network. The user must be responsible for carrying out retransmission control with other party. ATM provides no error detection operations on users payload inside the cell. It provides no retransmission services, and few operations are performed on the small header. The purpose of this approach is to implement a network fast enough to support multi-megabit transfer rates.
- **High Cost** As the technology is new and not commercially available; standards are still in development stage.

Cell Relay and the OSI Reference Model

The cell relay protocol corresponds to first two layer of OSI reference model. The part that corresponds to second layer, that is, data link layer is referred as ATM layer. However, ATM layer does not have all functions of data link layer. Therefore, a protocol referred as the ATM Adaptation Layer (AAL) is prescribed above the data link layer AAL is user defined and is not mandatory for cell relay usage.



Cell relay and the OSI reference model

6. Mobile Computing and framework

Definition

- Mobile computing involves a real-time, wireless connection between a mobile device and other computing environments, such as the Internet or an intranet.
- Mobile computing is taking a computer and all necessary files and software out into the field.
- Mobile commerce (m-commerce) involves e-commerce (EC) transactions that are conducted with a mobile device.

Services and Applications

- Mobile ticketing
- Mobile Money Transfer
- Content purchase and delivery
- Information services
- Mobile banking
- Mobile Browsing
- Mobile Purchase
- Mobile marketing and advertising

Mobile Ticketing

- Mobile Ticketing is the process where the customers can order, pay for, obtain and validate tickets from any location and at any time using Mobile phones.
- Mobile Tickets can be purchased in a variety of ways including online, via text messaging or in a secure mobile application.

Mobile Ticketing is used in many applications like:

1. Airline ticketing
2. Cinema ticketing
3. Railway & Bus ticketing
4. Concert/Event ticketing
5. Consumer voucher distribution

Mobile Money Transfer

- Mobile Money Transfer refers to payment services which are performed by using a mobile phone.
- By using this service we can transfer money from one person to other by using a mobile phone.

Example: ICICI bank has started IMPS – Immediate Payment Service. It is an interbank electronic instant mobile money transfer service through mobile phones

Content purchase and delivery

- Mobile content purchase and delivery mainly consists of the sale of ring-tones, wallpapers, and games for mobile phones.
- The convergence of mobile phones, portable audio players, and video players into a single device is increasing the purchase and delivery of full-length music tracks and video.

Information services

A wide variety of information services can be delivered to mobile phone users in much the same way as it is delivered to PCs. These services include:

- News
- Stock quotes
- Sports scores
- Traffic reporting

Mobile Banking Services are:

1. Mini-statements and checking of account history
2. Checking the balance
3. Recent transactions
4. PIN provision, Change of PIN and reminder over the Internet
5. Cash-in, cash-out transactions on an ATM

Mobile & Wireless Computation

- Wireless & Mobile are not synonymous
- Wireless
  - Is a transmission or information transport method that enables mobile computing
  - Communication is without wires
- Mobile Computing focuses on the applications side.
  - Ability to compute no matter where the user is
  - Infrared, cellular, radio waves, microwaves, satellite services.

Mobile Computing Framework

- Wireless delivery technology
- Mobile Information Access Devices
- Mobile Data Internetworking standards and equipment
- Mobile computing based business applications

7. Wireless Delivery Technology

Wireless delivery technology

1. Radio-Based Systems
2. Infrared or mobile based computing

1. Radio-Based Systems

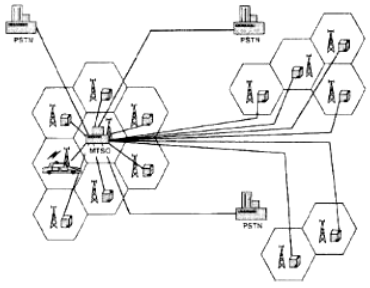
- These systems use radio frequency (RF) signals that range from 100 KHz to 20 GHz.
- RF communication is of three types
    - One way
    - Two way
    - Local way
- Radio-Based services can be grouped in two main categories
    1. Land Based
        - Cellular Communications
        - Wireless Packet Data networks(GPRS)
    2. Satellite Based(Satellite Networks)
        - Very Small Aperture Terminals(VSATs)
        - Paging and Satellite networks

2. Infrared or mobile based computing

- works by sending pulses of light from a LED to a photo sensor that diverts signals
- Computing devices can send as well as receives signals
- Types of infrared equipments
    - Low speed (115 kbps- 250 kbps)
    - High speed (about 1.25 mbps)
- There should not be any physical obstructions between sending and receiving
- Cost effective

8. Cellular communications

- In cellular system, the area of coverage is divided into smaller geographical areas called cells.
- Communication takes place with the help of transceivers
- A signal from the handset goes to nearest cell through telephone lines
- The size of cell is 2-10 miles
- Working



Cellular phone system

- Each cell has a base station with a tower which receives and transmits signals.
- All the base stations are connected by phone lines to mobile telephone switching office (MTSO).
- How does it work?
  - A caller communicates via radio channel to its base station, which sends the signal to MTSO.
  - If the called number is land based, MTSO sends the signal through central telephone office like any other phone call.
  - If the called number is mobile, MTSO sends the signal to the base station of the cell where the called number is. The base station transmits the signal to the called number using the available radio channel.
  - As the caller moves from one cell to another, MTSO automatically switches the user to an available channel in the new cell.

Cell Phones

- Cell phones communicate in the high frequency range:
  806-890 MHz and 1850-1990 MHz for the newly allocated ?CS' range.
- Cells are spaced 1-2 miles apart.
- The concept of cells is the key behind the success of cell phones because by spacing many cells fairly close to each other, the cell phones may broadcast at very low power levels (typically 200mW-1W, depending on system).
- Since the cell phones may broadcast at low power levels, they use small transmitters and small batteries.
- Reuse frequencies at cells that are not adjacent.

Encoding and Multiplexing

- With thousands of cellular phone calls going on at any given time, everyone cannot talk on the same channel at once.
- Therefore, several different techniques were developed by cell phone manufacturers to split up the available bandwidth into many channels each capable of supporting one conversation.
- Analog cellular systems use a 3 kHz audio signal to frequency modulate a carrier with transmission bandwidth 30 kHz.

FDMA

- FDMA (Frequency Division Multiple Access):
  - It is used on analog cellular systems.
  - When a FDMA cell phone establishes a call, it reserves the frequency channel for the entire duration of the call.

- The voice data is modulated into this channel's frequency band (using FM) and sent over the airwaves.
- At the receiver, the information is recovered using a band-pass filter.
- FDMA systems are the least efficient cellular system since each analog channel can only be used by one user at a time.
- These channels are larger than necessary given modern digital voice compression and are also wasted whenever there is silence during the cell phone conversation.
- Analog signals are also especially susceptible to noise.
- Given the nature of the signal, analog cell phones must use higher power (between 1 and 3 watts) to get acceptable call quality.

TDMA

- TDMA (Time Division Multiple Access):
  - TDMA builds on FDMA by dividing conversations by frequency and time.
  - Digital compression allows voice to be sent at well under 10 kilobits per second (equivalent to 10 kHz).
  - TDMA shares the same channel with multiple sessions.
  - While TDMA is a good digital system, it is still somewhat inefficient since it has no flexibility for varying digital data rates (high quality voice, low quality voice, pager traffic).
  - In other words, once a call is initiated, the channel/timeslot pair belongs to the phone for the duration of the call.
  - TDMA also requires strict signalling and timeslot synchronization.
  - Due to the digital signal, TDMA phones need only broadcast at 600 mW.

CDMA

- CDMA (Code Division Multiple Access):
  - CDMA uses 'spread spectrum' techniques.
  - CDMA has been likened to a party: When everyone talks at once, no one can be understood, however, if everyone speaks a different language, then they can be understood.
  - CDMA systems have no channels, but instead encode each call as a coded sequence across the entire frequency spectrum.
  - Each conversation is modulated, in the digital domain, with a unique code (called a pseudo-noise code) that makes it distinguishable from the other calls in the frequency spectrum. Using a correlation calculation and the code the call was encoded with, the digital audio signal can be extracted from the other signals being broadcast by other phones on the network.
  - Since CDMA offers far greater capacity and variable data rates depending on the audio activity, many more users can be fit into a given frequency spectrum and higher audio quality can be provide.

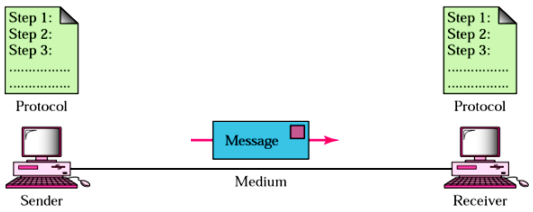
— The current CDMA systems boast at least three times the capacity of TDMA systems.
— CDMA technology also allows lower cell phone power levels (200 miliwatts) since the modulation techniques expect to deal with noise and are well suited to weaker signals.
— The downside to CDMA is the complexity of deciphering and extracting the received signals.

9. Data Communication Protocols.

In Data Communications, data generally are defined as information that is stored in digital form. Data communications is the process of transferring digital information between two or more points. Information is defined as the knowledge or intelligence.

The effectiveness of a data communications system depends on four fundamental characteristics: delivery, accuracy, timeliness, and jitter.

A data communications system has five components:



1. Message:

The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.

2. **Sender:**

The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.

3. Receiver:

The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.

4. Transmission medium:

The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.

5. Protocol:

A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices

IOS-OSI Reference model

The **International Organization for Standardization (ISO)** is a multinational body dedicated to worldwide agreement on international standards. Established in 1947,

An ISO standard that covers all aspects of network communications is the **Open Systems Interconnection (OSI) model.** It was first introduced in the late 1970s.

- **ISO is the organization.**
- **OSI is the model.**

TCP/IP Reference model.

- The TCP/IP (Transmission Control Protocol/Internet Protocol) is a protocol suite (a set of protocols organized in different layers) used in the Internet today.
- The original TCP/IP protocol suite was defined as four software layers built upon the hardware. Today, however, TCP/IP is thought of as a five-layer model. Figure 1 shows both configurations.

Layered Architecture

- To show how the layers in the TCP/IP protocol suite are involved in communication between two hosts, we assume that the links are connected by one router, as shown in Figure 2.

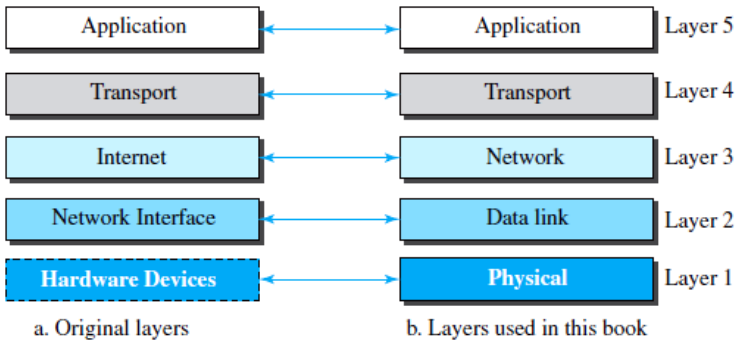


Figure 1.Layers in the TCP/IP protocol suite

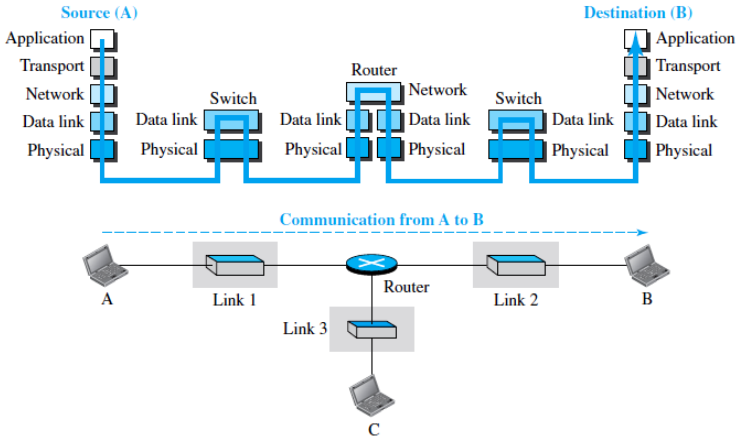


Figure 2.Communication through an internet

Physical Layer

- The physical layer is responsible for carrying individual bits in a frame across the link.
- The physical layer is the lowest level in the TCP/IP protocol suite.

Data-link Layer

- The data-link layer have seen that an internet is made up of several links (LANs and WANs) connected by routers.
- The data-link layer takes a datagram and encapsulates it in a packet called a **frame**.

Network Layer

- The network layer is responsible for creating a connection between the source computer and the destination computer.
- The communication at the network layer is host-to-host.

Transport Layer

- The logical connection at the transport layer is also end-to-end.
- The transport layer at the source host gets the message from the application layer, encapsulates it in a transport layer packet and sends it, through the logical (imaginary) connection, to the transport layer at the destination host.

Application Layer

- The two application layers exchange **messages** between each other as though there were a bridge between the two layers.
- Communication at the application layer is between two **processes**.

  - ✓ Hypertext Transfer Protocol (HTTP).
  - ✓ World Wide Web (WWW).
  - ✓ Simple Mail Transfer Protocol (SMTP).
  - ✓ File Transfer Protocol (FTP).
  - ✓ Terminal Network (TELNET).
  - ✓ Secure Shell (SSH).
  - ✓ Simple Network Management Protocol (SNMP).
  - ✓ Domain Name System (DNS).
  - ✓ The Internet Group Management Protocol (IGMP).