(17E00307) MOBILE COMMERCE

Objective: The objective of the course is to describe M-commerce system concepts ,to critically analyze examples and cases of M-commerce systems and to examine some of the applications in M-commerce

1. Current Status and Future Trends in Mobile Commerce, Technology Issues in Mobile Commerce, Mobile Commerce Systems, Mobile Ecommerce on Mobile Phones, Technologically advanced handheld devices, like Smart phones, PDAs, Laptops, Tablets and Portable gaming consoles etc.
2. Transactional Database Accesses for M-Commerce Clients, Techniques to facilitate Information Exchange in Mobile Commerce, Information System and Application Issues in Mobile Commerce, The emergence of Location based Mobile Commerce, The need for Mobile based Approaches
3. Managing the Interactions Between Handheld Devices Mobile Applications and Users, Mobile Commerce and Usability, a Landscape Analysis,
4. Mobile marketing, mobile ticketing, mobile computing, mobile payments and mobile banking vis-a-vis latest technologies (wireless and mobile communication technology, digital cellular technology, mobile access technology and 4G and 5G systems
5. Configuring M-Commerce Portals for Business Success, Knowledge Management in a Mobile Computing Context, Multimedia Messaging Peer Mobile Financial Services, Mobile Banking – A Strategic Assessment, Service for Mobile Commerce Applications, Quality of Perception in M Commerce

Text Book:

- Advances in Mobile Commerce Technologies, EE-Peng Lim, KengSiau, Idea Group of Publishing

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BASICS

CONTENTS:

1. INTRODUCTION:

As the number of mobile device users increases rapidly and exceeds that of Personal Computers (PC) users by a large margin, conducting business and services over these mobile devices, also known as mobile commerce. It is becoming very attractive and is expected to drive the future development of electronic commerce.

Our world today is so much different from our previous generations. With the invention of the internet, everything is fast and happens online. Long gone are those days when people shop around 3-4 stores with the total distance of a few kilometers deciding which product to buy. These days, all considerations are done online before we made it to the physical store and most of the products are just a few clicks away from us. The terms E-Commerce or web store have been on the market for a while, but M-Commerce and mobile shopping app etc,. are quite new comers. M-Commerce enables users to access the internet without need to find a place to plug in.

COMMERCE: Activity of buying and selling especially on a large scale new commerce.

2. DEFINITION OF MOBILE COMMERCE:

Mobile Commerce is defined as "Buying and Selling of goods and services with the use of internet/cellular data via hand held wireless devices such as phones, tablets etc."

3. HISTORY:

The phrase mobile commerce was originally coined in 1997 by "KEVIN DUFFEY" at the launch of the global mobile commerce forum, which mean " to delivery of electronic commerce capabilities directly into the consumers hand ,anywhere, via wireless technology."

The global mobile commerce forum, which came to include over 100 organizations, had its fully minuted launch in London on 10-nov-1997. "KEVIN DUFFEY" was elected as the executive chairman at the 1st meeting.

Over 100 companies joined within a year ,many forming mobile commerce teams of their own, eg – mastercard & motorola.

PDA'S and cellular phones have become so popular that many businesses are beginning to use mobile commerce as a more efficient way to communicate with their customers.

4. MODES OF BUSINESS:

A.Traditional Bussiness and
B.Electronic Bussiness

A.Traditional Business:

Traditional business represent the hierarchical organizational structure in a business. Power flows Upward, and employees are departmentalized. All employees follow a chain of commands such as a manager is the chief co-ordinator of all departments. Each department had a head who report to the manager.

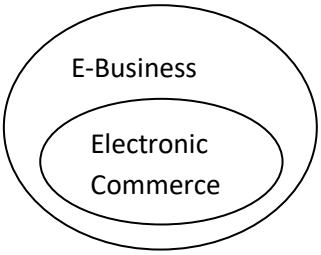
Simply, traditional business is if you go to a particular shop across the counter, you inspect certain things, see the variety of stock that is available and then select to one particular product you want to purchase, and finalize the product, make payment for the product and come back home. This is the traditional way of doing business.

B.Electronic Business (E Business):
E-Business – conduct of industrial activities, commercial activities and trade activities using computer network.
When we talk digitilizing the whole country (Digital India) we are heading more towards E-Business. When business is done online. Now-a-days 70% of business done online.

E-Business ---------includes ----------E-Commerce

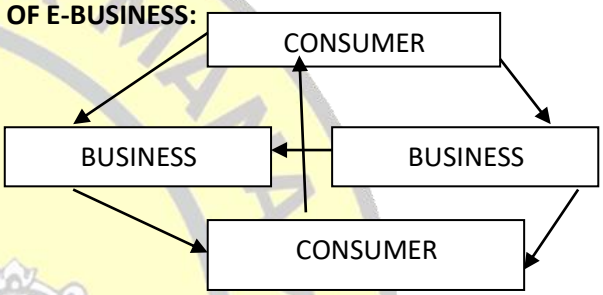
Broad concept
Buying & selling of products
Finance
Product development
HRM
Production

Only buying and selling of products.



5. SCOPE OF E-BUSINESS/ DIFFERENT WAYS OF E-BUSINESS:

- Business to Business commerce(B2B)
- Business to Customer commerce(B2C)
- Customer to Customer commerce(C2C)
- INTRA business commerce
- Business to employees commerce



1. Business To Business Commerce: (B2B COMMERCE)
Definition: B2B Is defined as One Business is interacting with another Business.
This include all the interactions ie., from one business to another business.
Starting from
a.Purchase of raw material (suppliers of raw materials)
b.Orders from different distributors.(to sell my products)
c.Hiring of marketing agency for designing advertisement of my product.
d.Loan from a bank
The above all come under B 2 B Business...
Example: A car manufacturing firm.
It has to interact bank for finance
Suppliers for car components
Marketing agencies for advertising
Orders and payments received electronically

2.Business To Customer Commerce(B 2 C Commerce):
Definition: When a business firm is interacting with its present customers or prospective customers using computer network is called B2C Commerce.
When you advertise your product, sending mails, selling your products online (websites)
EXAMPLE: When you enter a particular website, you are entering into a shop in the E-world, you select the categories, size, colour, etc.,
Online Shopping: amazon, flipkart, understand the preference of customers.

3.Customer To Customer Commerce(C2C COMMERCE):
Definition: When a customer comes in direct contact of an another customer is called C2C ie., buyer & sellers- both are customers.
It is useful for those goods and services where there is no established market system.
Like sale of old cars, furniture, mobiles.
Customer goes to website; discuss the quality among themselves before taking final decisions.
EXAMPLE: OLX

4. INTRA BUSINESS COMMERCE (INTRA BC):
Definition: Interactions With in the Business Commerce.
Now-a-days the different departments in a particular organization using computer network.

Marketing
Production
Sales
Finance
Human Resource
} These are all in contact with one-another

EXAMPLE: If marketing department wants to update the production department regarding design of the product can be do so through INTRA Business Commerce.

5.Business To Employees Commerce (B 2 E COMMERCE):
Definition: Interaction between the business and employees using computer network for better employee and employer relationship.

EXAMPLE: work from home
Video conference
Tele conference
Increase efficiency

6. DIFFERENCES BETWEEN TRADITIONAL BUSINESS AND ELECTRONIC-BUSINESS:

S.NO	TRADITIONAL BUSIENSS	ELECTRONIC-BUSINESS
1	Formation is difficult (different forms that a business can be organized.)	It is very easy to form.(just a website to form and start business)
2	Physical presence is definitely require.(buyer & seller presence)	Customer & seller presence not required
3	Locational requirements manufacturing department is very close to raw-materials.	No locational requirements
4	Cost of setting up is very high.	very low. (works on network)
5	Operating cost is very high	Very low
6	Contact of customers middlemen present franchise to him	Direct contact with the customer
7	Response of meeting customers, time long	Instant
8	Top level management Middle level management Low level management	Direct
9	The shape of organization is vertical (top,middle,low)	Organizational structure is horizontal
10	Length of business cycle is long (purchase, production, marketing)	Length of business cycle is short
11	Opportunity for personal touch is high	Not there

7.DIFFERENCES BETWEEN E-COMMERCE AND M-COMMERCE:

	E-COMMERCE	M-COMMERCE
DEFINITON	E-COMMERCE refers to the activities of buying and selling products and services with the use of electronic systems such as the internet.	M-Commerce refers to the process of buying and selling products & services with the use of internet/cellular data via wireless handheld devices.
HISTORY	1970'S	1990'S
DEVICES USED	Computers,laptops	Wireless handheld devices such as cellphone, ipads, and tablets.

CONNECTIVITY	Smaller	Large owing to the bigger number of mobile users.
MOBILITY	LIMITED	Less limited because of lighter weight & smaller size leading to easier to carry.
REACH	Only at the places where the electricity and the internet are available.	Broader due to its portability
USAGE	Difficult because of a more complicated user interface and more functions.	Simple because all function have been simplified.
COST	Less costly as created on the web store plat form and there is a usage of internet.	More costly as mobile app is required and there is a usage of cellular data or internet.

8. PRODUCT AND SERVICES AVAILABLE:

Mobile money transfer
Mobile ticketing
Mobile vouchers, coupons and loyalty cards
Content purchase & delivery
Location based services
Information services
Mobile banking
Mobile purchase
Mobile browsing
Auctions
Mobile marketing and advertising
In – application mobile phone payments.

EXPLANATION

1.Mobile Money Transfer:
M-PESA, Airtel money, mobile ATM, (in foreign countrkies) monthly phone bills.

2.Mobile Ticketing:
Tickets can be sent to mobile phones using a variety of technologies.
Example: IRCTC.

3.Mobile Vochers,Coupons and Loyalty Cards:
Mobile ticketing technology can also be used for the distribution of vouchers, coupons & loyalty cards. These are virtual tokens that are sent to the mobile phone. The customers represent virtual tokens at POS (POINT OF SALE) receives discounts.

4. Content Purchase and Delivery:
Sale of ring tones, wallpapers,games for mobile phones. The convergence of mobile phones, portable audio player, and video players into a single device is increasing the purchase and delivery of full-length music tracks and video. The download speeds available with 4G networks make it possible to buy a movie on a mobile device in a couple of seconds.

5.Location Based Services:
Local discount offers.
Local weather
Tracking & monitoring of people

6.Information Services:
News, Stock quotes, Sports scores, Financial records, Traffic reporting, Emergency alerts, etc.

7.Mobile Banking:
WWW make transactions, such as purchasing stocks remitting money.

8.Mobile Purchase:
Catalog merchants (customers select the products from printed catalogs in the store and fill out an order)

9.Mobile Browsing:

WWW (World Wide Web) browser on a mobile device customers can shop online without having to be at their Personal Computer(PC).

10.Auctions:

Over the past three years, mobile reverse auction solutions have groun in popularity. One -time purchase , how ever reverse auctions offer a high return for the mobile vendor as they require the consumer to make multiple transactions over a long period of time.

11.Mobile Marketing and Advertising:

The consumer get a marketing message or discount coupon and within a few seconds, make a decision to buy and go on to complete the sale.

Example: mom buy baby products online.

No need to search websites.

12.In-Application Mobile Phone Payments:

Payments can be made directly inside of an application running on a popular smartphone operating system such as google as Google android.

Payment Methods:

Credit & debit cards, contactless payments, micro payments, store-value cards etc.

9.WIRELESS SERVICES MOBILE COMMERCE(M-Commerce):

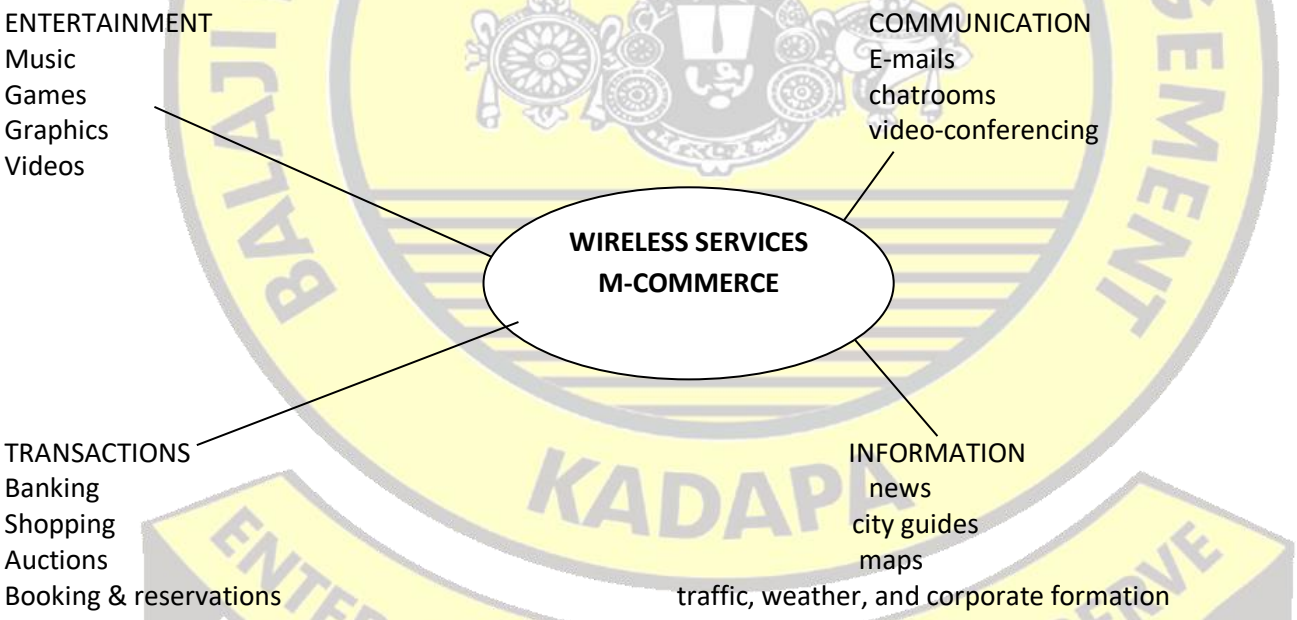
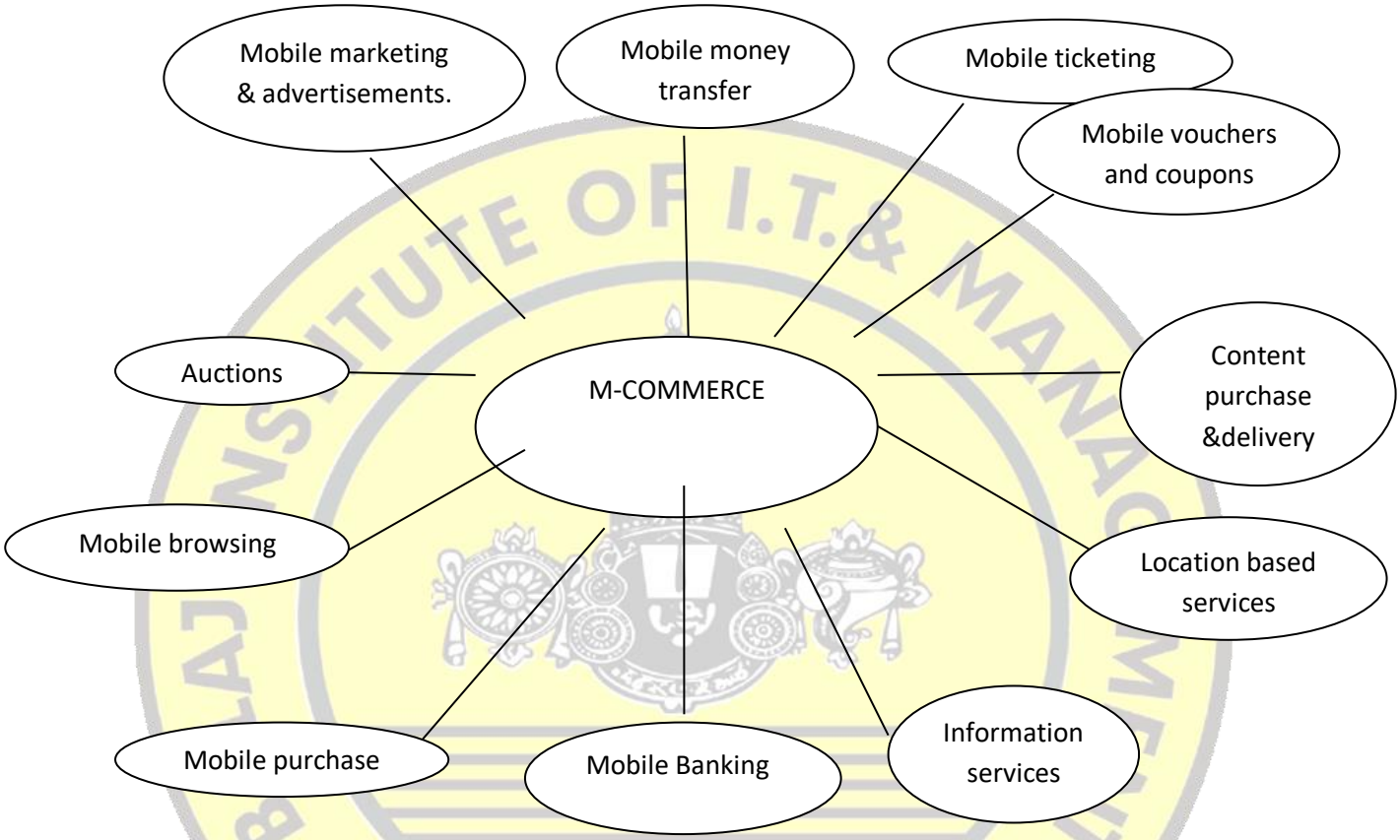


FIGURE: PRODUCT AND SERVICES AVAILABLE IN M-COMMERCE:



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UNIT-1

1. CURRENT STATUS & FUTURE TRENDS IN MOBILE COMMERCE

Advances in wireless technology increase the number of mobile device users and give pace to the rapid development of E-Commerce using these devices.

The new type of E-Commerce, conducting transactions via mobile terminals, is called M-Commerce.

Due to its inherent characteristics such as ubiquity, personalization, flexibility, and dissemination, mobile commerce promises business unprecedented market potential, great productivity, and high profitability.

1.1 Features of M-commerce:

1. Ubiquity
2. Reachability
3. Localization
4. Personalization
5. Dissemination

1. **UBIQUITY:**

- Presence everywhere or in many places especially simultaneously: Omni presence.
- Users can get any information that they are interested in ,whenever they want regardless of their location, through internet-enabled mobile devices.

2. **REACHABILITY:**

- Through mobile devices, business entities are able to reach customers anywhere anytime.
- On the other hand, a user can be in touch with and available for other people anywhere anytime.

3. **LOCALIZATION:**(The knowledge of the user's physical location at a particular moment.)

- Many location based applications can be provided.
- **For example**: with the knowledge of the user's location.

A. The mobile service will quickly alert him/her when his/her friend/colleague is nearby.
B. To locate the nearest restaurant/ATM.

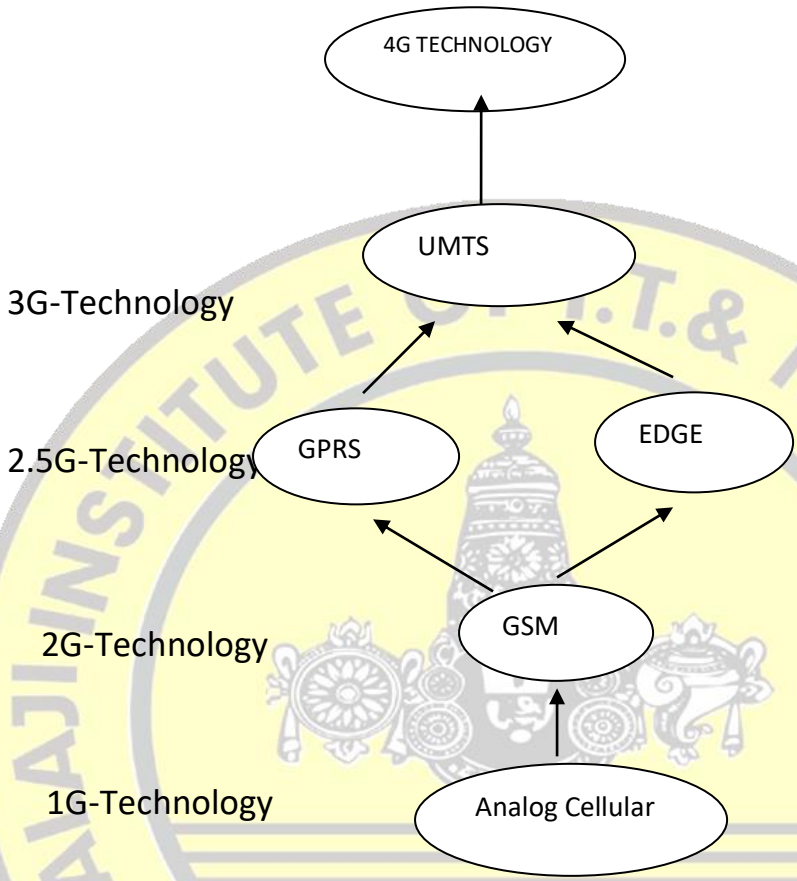
4. **PERSONALIZATION**:
   Since owners of mobile devices often require different sets of applications & services, M-Commerce applications can be personalized to represent information or provide services in ways appropriate to a specific user.
5. **DISSEMINATION:**

- Some wireless infrastructures support simultaneous delivery of data to all mobile users within a specific geographical region.
- Thus offers an efficient means to disseminate information to a large consumer population.

1.2 Evolution of Wireless Communication Technology:

2G-GSM(Global Sysem For Mobile Communication)

- 2G operating in the 900MHZ and the 1800MHZ frequency band.
- It is developed by the European telecommunications standards.
- GSM digitizes and compresses data, then sends it down a channel with two other streams of user data each in its own time slot.
- Mobile services based on GSM technology were first launched in FINLAND in 1991.
- GSM ,together with other technologies, is part of the evolution of wireless mobile telecommunications.



2.5G – GPRS AND EDGE:

- GPRS: General Packet Radio Service.
- EDGE: Enhanced Data GSM Environment.
- GPRS: Rather than sending a continuous stream of data over permanent connections, GPRS users only the network when there is data to be sent.
- Users can send and receive adapt at speeds of up to 115K bits/second with GPRS.

EDGE: A Faster version of GSM, enabled the delivery to multimedia and other broadband applications.

- 384K bits/second –EDGE.

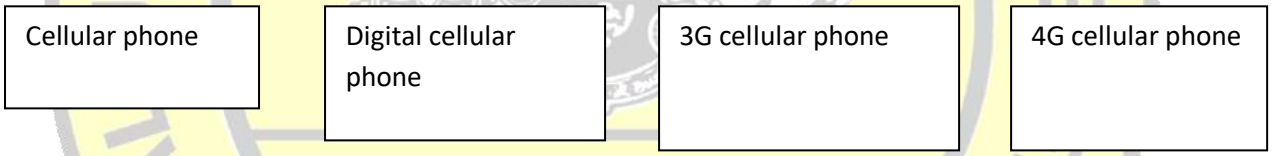
3G- UMTS(Universal Mobile Telecommunications System):

- It aims to offer higher bandwidth, packet based transmission of text, voice, video, and multimedia needed to support data-intensive application.
- Integrating the functions of a whole range of different equipments , the new 3G-enabled mobile phone can be used as phone, a computer, a television, a paper, a video conferencing centre, a newspaper, a diary and even a credit card

4G TECHNOLOGY:

Better modulation methods and smart antenna technology are the two main research areas.

Evolution Of Wireless Technology



1st Generation 2nd Generation 3rd Generation 4th Generation

1.3 Merits of M-commerce:

- Increase in productivity
- Entertainment
- Portability
- Cloud Computing
- Cover wide distance
- Savings
- Easy to use
- Customer deals

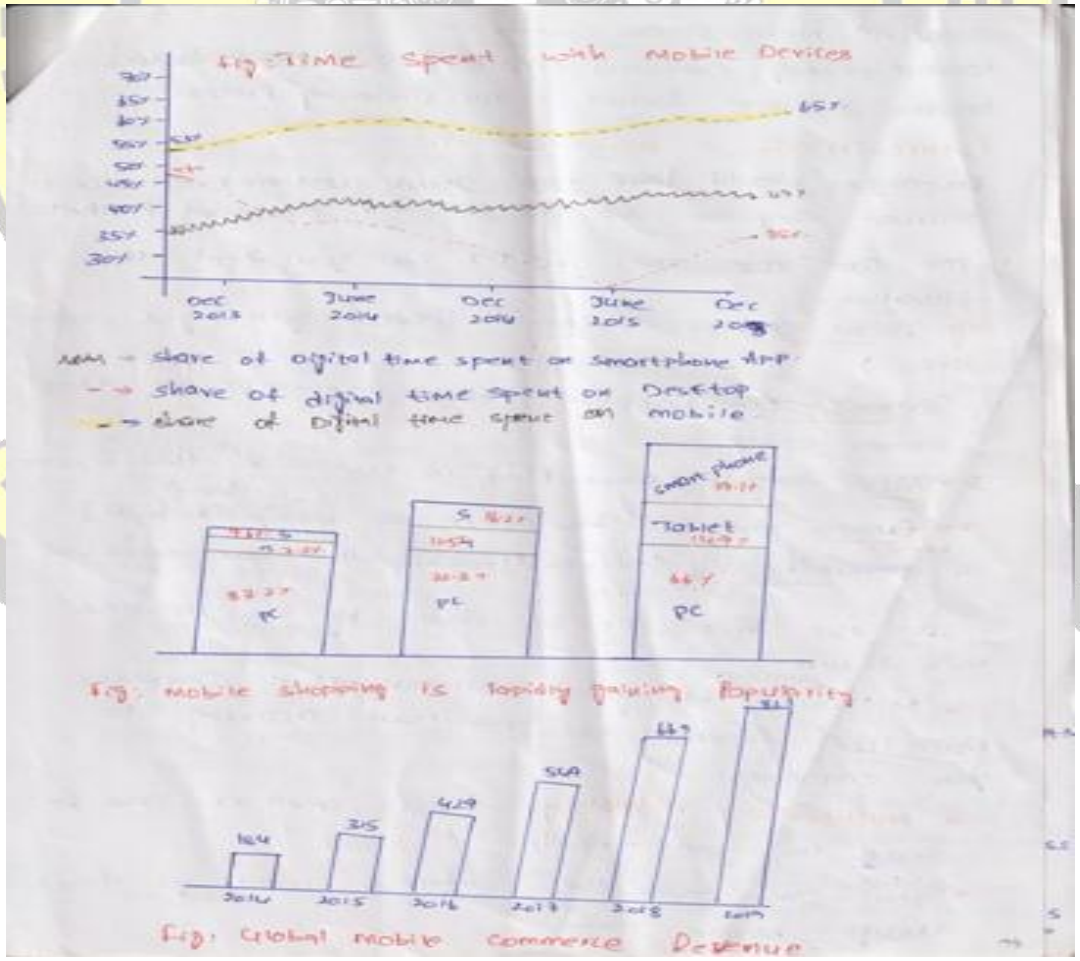
1.4 De-Merits Of M-Commerce:

- Quality of connectivity
- Security concerns
- Power consumption

- Smart phone limitation
- Risky factor
- Band width access
- Investment risk
- Legal concerns
- Absence of killer applications
- Increased fraud risk

1.5 Future of Mobile Commerce:

- I have a mobile, tablet, watch all are using at a time, and device become Personal Digital Assistant (PDA) in future.
- There is a dynamic increase in mobile devices.
- In future more & more time spent with mobile devices.



Situational purchases are complex

Location, timing, consumer emotions and other factors become decisive factors in the purchasing process.

1.6 Future Trends In Mobile Commerce:

Companies should learn more about customer emotions because they are the decisive for purchasing products.

1. You can ask the computer how you feel the situation.

   EG: facial expression analysis (check your eyes, expressions.)

2. Galvanic skin response heart response, pulse this already exists.
3. Voice analysis (what kind of expression this person have)
4. Emotion analysis (how does a person behave)
5. Personalization (software/machine tells you about him)

   All the above can be done by new devices in future.

- Microsoft has given software that composes music life according to your mood according to your emotions.
- **MULTISAENSORY TECHNOLOGY**(Taste, smell, etc, can be sent to your friend)
- You can touch the surfaces what you feel through mobile phone.

New Sensory Experiences- **(GESTURE CONTROL)**

- You dial phone number on your skin, play games, and create shortcuts on your arm.
- With the bracelet – do what you use to do with a tablet but directly on your skin and without any smart phone.
- Mobile devices as projectors.
- Good decisions based on your preferences.

2.TECHNOLOGY ISSUES IN MOBILE COMMERCE

M-Commerce provides the potential for organization and user to perform various commerce related tasks without regard to time and location.

Owing to wireless nature of these devices, there are many issues that affect the functioning of M-Commerce.

The main issues that concerned mobile/wireless device users prevented them from using their devices to engage in M-Commerce revolve around.

1. Safety and security
   a. Network technologies and
   b. Radio interface
2. Connectivity or communication infrastructure
3. Other issues related to wireless devices.

1. **SAFETY AND SECURITY:**
   The most important element when we are dealing with M-Commerce is security issues and how we can make it safe for customers to feel comfortable when using mobile phones, so in order to attract as many customers we need to insure the quality of the security level provided. M-Commerce is not possible without a secure environment, especially for those transactions involving monetary value.

a. **SECURITY ISSUES RELATED TO NETWORK TECHNOLOGIES:**

GSM provides a relatively secure connection through PIN (Personal Identification Number) when turning on the handset. An authentication protocol between handset and the network through SSL encryption of voice & data is also there in GSM. But it is not enough to convince people. In order to get the confidence of critical mass of consumers, more is expected in the field of security.

M-Commerce applications especially those involving payment need to be secured to assure customers.

For Example: In a payment scenario both sides will want to authenticate each other before committing to a payment. Also customer, will want assurance about delivery of goods & services.

b. SECURITY ISSUES RELATED TO RADIO INTERFACE:

Access to a telecommunication network requires the protection of transmitted data in terms of confidentiality, integrity and authenticity. In particular ,the users data should be protected from eaves dropping.Different security mechanisms for different mobile network technologies like 2G, 3G, 4G.

2. CONNECTIVITY/COMMUNICATION INFRASTRUCTURE:

Every mobile user in concerned with the quality of communication infrastructure in place .since, it is one thing which decides the robustness of the network provided y the operator.

Connectivity is also a major area of concern since many a time user couldn't access the network/mobile phone is out of coverage.

Due to mobile nature of the wireless devices this problem is more acute especially when a user is in middle of a transaction.

3. OTHER ISSUES RELATED TO WIRELESS DEIVECES:

A. User interface
B. Information disclosure
C. Speed concern
D. Pricing of M-Commerce services
E. Privacy & advertisement

A. USER INTERFACE:

- M-Commerce applications depend a lot on the user interface.
- User interface should be dynamic & adaptable.

B. INFORMATION DISCLOSURE:

- The technological constraints of mobile devices including small screen sizes and limited memory can limit the amount of information that consumers have access to during a transaction.
- **EXAMPLE**: SMALL SCREEN – limits the amount of text that can be displayed to a consumer.

C. SPEED CONCERN:

Slow or unstable connections, fearing they would be cutoff in the middle on monetary transactions ; many users limit their use of M-Commerce.

D. PRICING OF M-COMMERCE SERVICES:

How to price mobile commerce services because several carriers are likely to be involves in completing a M-Commerce, another issue is how to divide revenues among multiple carriers.

E. PRIVACY AND ADVERTISEMENT:

M-Commerce transactions involve the collection of personal information about consumers ,including their financial details. Given this M-Commerce transactions raise privacy issues for consumers.

3. MOBILE COMMERCE SYSTEMS:

Understanding or constructing a mobile commerce system is an arduous (difficult) task because the system involves a wide variety of disciplines and technologies.

To facilitate & understand M-Commerce systems are divided into six components.

1. Mobile commerce applications
2. Mobile stations
3. Mobile middle ware
4. Wireless networks
5. Wired networks and
6. Host computers.

3.1 Requirements of a Mobile Commerce System:

1. It should allow end users to perform M-Commerce Transactions easily, in a timely manner and ubiquitously.
2. It should allow products to be personalized.
3. Program/data independence is held, that is changing the system components will not affect the existing program/data.

End-to-end security is rigorously enforced.

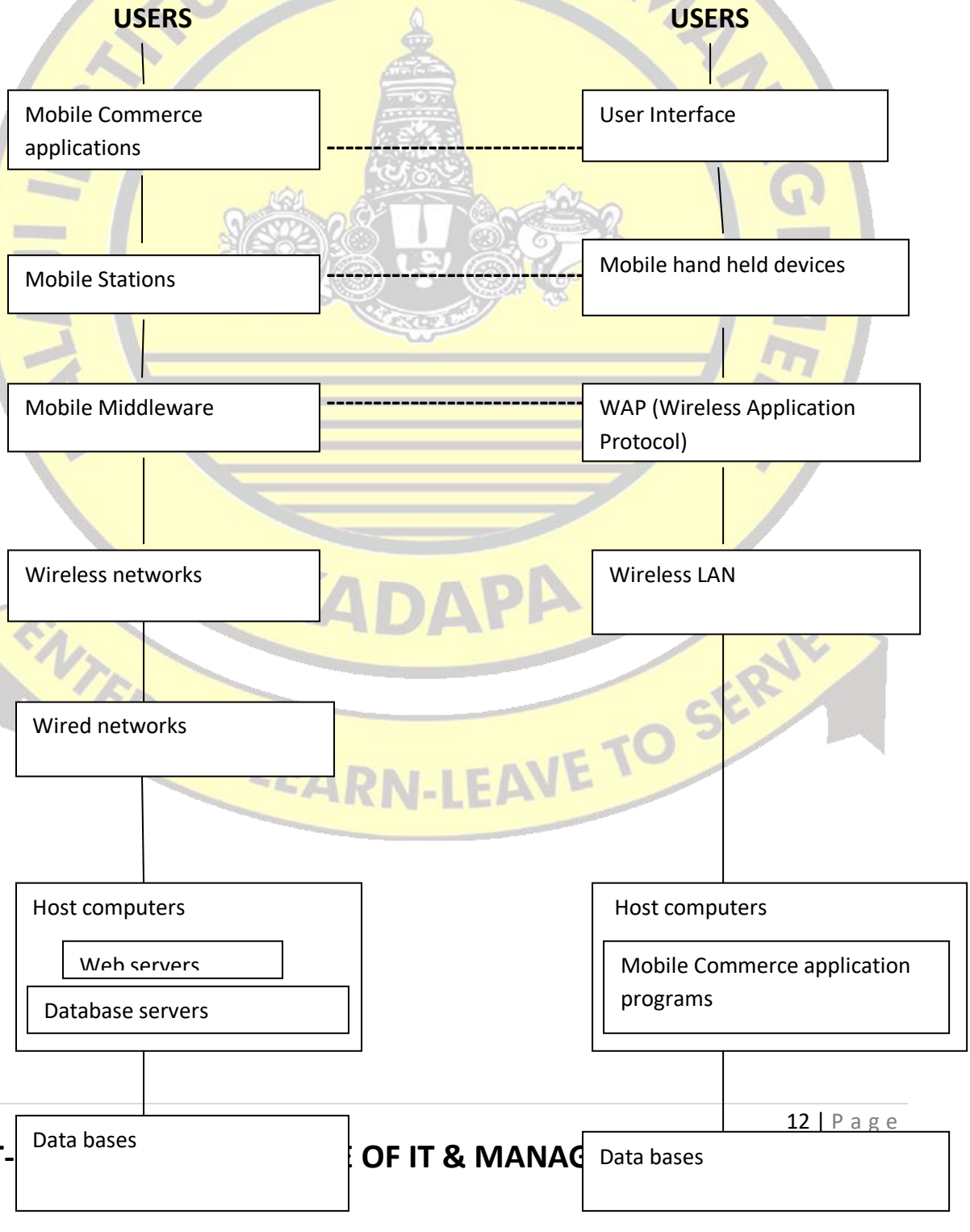
EXPLANATION:

1. **MOBILE COMMERCE APPLICATIONS:**
   A content provider implements an application by providing two sets of programs.
   - Clint – side program (such as user interface)
   - Server-side program (such as database access and updating)
2. **MOBILE STATIONS:**
   It represent user interfaces to the end users who specify their request on the interfaces.
3. **MOBILE MIDDLEWARE:**
   The major purpose of mobile middleware is to seamlessly and transparently map internet contents to mobile stations that support a wide variety of operating systems ,markup languages, micro browsers and protocols.
4. **WIRELESS NETWORKS:**
   M-Commerce is possible mainly because of the availability of wireless networks. User requests are delivered to either the closest wireless access point or a base station.
5. **WIRED NETWORKS**:
   This is optimal for M-Commerce.
6. **HOST COMPUTERS:**
   A user request example: data base access is actually processed at a host computer,which includes 3 major kinds of software.

- Web servers.
- Data base servers
- Application programs.

3.2 Flowchart of A User Request Processed In a M-Commerce:

Figure: Mobile Commerce System Structure



4. MOBILE E-COMMERCE ON MOBILE PHONES

- First write about E-Commerce
- Evolution of wireless communication technology
- Scope of E-Business (mainly B2C)
- Difference between E-Commerce & M-Commerce
- Demerits of M-Commerce

Mobile E-Commerce wireless extension of the internet E-Commerce

Business To Consumer E-Commerce (B2C E-COMMERCE)

Generally commerce refers to the exchange of goods for money.

FIG: Commerce as a set of actions

Here consumer & merchant communicate indirectly via software entities & the internet.

- Write demerits of M-Commerce
- Write about web shopping (online shopping),write in a step wise manner like above figure.
  EXAMPLE: books, movies, music etc.
- Web banking

Mobile E-Commerce = Mobile Commerce

Mobile E-Commerce is E-Commerce brought to mobile users via mobile devices such as palmtops, PDA or most dominantly, mobile phones.

4.1 Mobile E-Commerce Receipt System:

Currently there is no receipt system. systems for cinema ticket such as the one offered by Telenor mobile in Norway, have only a very primitive scheme for receipt. After the user confirms the acquisition of the tickets by entering his PIN Code, he will receive a code, example: a four or six digit number .To collect his cinema tickets, the user tells the code at the ticket desk. The person in charge compares the code with the one he received earlier. If they match he/she delivers the purchased tickets to the user.

4.2 Ideal Solution For Mobile Receipt:

Ideally ,a contract stating all the details of the deal i.e., the goods ordered ,prices and quantity etc., should be signed digitally by the merchant and then send to the user mobile phone for local storing in a phone. At the delivery counter, the user can connect his phone via for example: a cable, a socket, or wireless using Bluetooth to the delivery system and handover the signed contract. The delivery entity verifies the signed contract and if valid delivers the goods to the user.

Mobile E-Pay supports payment functions such as prepaid account, which interface towards financial systems.

With mobile E-Pay the user can perform in a secure way.

5. TECHNOLOGICALLY ADVANCED HANDHELD DEVICES:

5.1 SMART PHONE:

- A smart phone is a handheld personal computer.
- Smart phones use a mobile operating system and are able to process a variety of software components known as “APPS.”
- Today, smart phones largely fulfill their users needs for a microphone, digital camera, communication devices (online chat, emails, video chat) through the internet by WI-FI as well as mobile broad band, audio recorder, satellite navigation system, clock, news, weather, web browser, games.

HISTORY:

The first commercially available device that could be properly referred to as a "smart phone" began as a prototype called "ANGLER" developed by FRANK CANOVA in 1992.

MOBILE PHONE DEVICES

- Motorola(America)-android OS-provide cloud services-some of Motorola devices are Motorola Defy, Motorola milestone, Motorola Razr, Motorola fire.
- Apple(America)-iphone,iphone4s,iphone6s,mytouch
- LG(South Korea)-CDMA and GSM-4G LTE,marquee,spectrum,optimus
- Samsung(south korea)- omniaw , galaxy s2,Galaxy Note, Galaxy R.
- Sony Ericson(Sweden)-Xperia10,cedar,Aspen,Xperia,mini,Xperia play.

5.2 PDA(PERSONAL DIGITAL ASSISTANT)-POCKET COMPUTER

- PDA also known as palmtop computer/handheld computer/day planner(that stores contact addresses).
- Modern PDAs has the capability to connect to internet, can act as cell phone, has GPS navigational features and can run multimedia software.
- External keyboard can be connected via **USB.**
- **APPLE COMPUTER**: 1st introduced PDA called **Newton Message Pad,** in 1993. It was then followed by **Palm Pilots** by palm computing INC.
- PDA'S offer standard Microsoft office applications, better internet browsing, but requires more processing Power to run.
- Same PDA run on palm OS which is much simpler to use, requires less processing powerand offers better handwriting recognition capability.
- Windows mobile runs a variety of mobile applications including EXCEL, WORD & POWERPOINT.

- Main applications areas of PDAs include medical & scientific uses, educational uses etc.

Popular Brands of PDA:

Palm taxi aka palm-pilot,TungstenE2, Zive 72, palm pilot personal & palm pilot professional, Handspring visor, Z22 etc.

5.3 LAPTOPS:

- A personal computer that can be easily carried around.
- More portable
- A laptop has an all in one design (like built in monitor, keyboard, speaker, touchpad)
- Most laptops have the same amount of ports (USB, ETERNET) as a desktop computer.
- Parts of laptop are DESKTOP, Keyboard, Track pad, And Control Panel.

Control Panel**:** The place to go when you need to make changes to various settings.

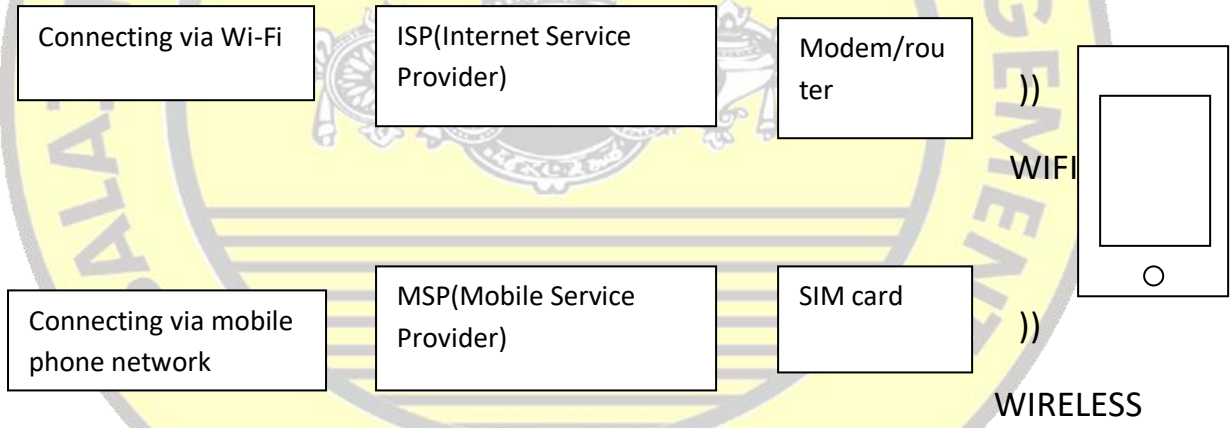
A. To Access In Windows 7: Click start button on bottom left & then click control panel on right column.
B. To Access In Windows 8: swipe to the right of the screen & choose settings.
   - The first laptop was invented by ADAM OSBORNE in 1981.

HARDWARE	ADVANTAGES	DIS ADVANTAGES
Display	Productivity	Performance
CPU	Connectivity	Health effects
Memory	Site	Neck & spine
Inputs/outputs	Low power consumption	(a large & higher quality external screen can avoid neck & spin)
Battery & power supply	Quiet	
Charging trolleys	Battery	

5.4 TABLETS:

- A tablet is a wireless touch screen Personal Computer(PC) that is smaller than a notebook but larger than a Smartphone.
- In 2001 Microsoft introduced the first tablet prototype as the **windows XP TABLET PC** edition.
  1. Convertible
  2. Slate
  3. Hybrid
  4. Rugged

- Many advantages in tablets, like web browser, play games, send & receive emails, more things to do like your PC (watching movies, reading books, exams), install apps.
- They come in different sites (7 inch or 10 inch) screen.



- Pre-Installed Apps: a calendar application, clock, a notepad, camera app, iTunes, books, games, maps etc.

5.5 PORTABLE GAMING CONSOLES:

- A hand held game console is a small, portable self contained video game console with a built in screen, game controls and speaker.
- These are smaller to home video game consoles and allowing people to carry them and play them at any time or place.
- In 1976 **MATTEL** introduced the first handheld electronic game with the release of **AUTO RACE**.

  Notable Handheld Consoles Of The Mid 2010s

1. New Nintendo 3Ds (2014-15)
2. New Nintendo 3Ds XL (214-15)
3. Ardu boy (2014)
4. GPD XD (2015)
5. GPD win (2016)
6. Nintendo Switch (2017)
7. New Nintendo 2Ds XL (2017)

5.6 OVERVIEW:

	LAPTAP	**NOTEBOOK**	**SMARTPHONE**	**TABLET**
Screen size	11-20 Inch	10-12 inch	2-4.3 inch	7-11 inch
Make phone calls	No	NO	Yes	Yes
CD/DVD Drives	Yes	NO	No	No
Keyboard	Full size physical	Mini physical keyboard	Qwerty Keyboard on touch screen	Qwerty
OS	Windows7,vista,XP	Windows Linux	Smartphone	Operating system

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(17E00307) MOBILE COMMERCE

Objective: The objective of the course is to describe M-commerce system concepts ,to critically analyze examples and cases of M-commerce systems and to examine some of the applications in M-commerce

1. Current Status and Future Trends in Mobile Commerce, Technology Issues in Mobile Commerce, Mobile Commerce Systems, Mobile Ecommerce on Mobile Phones, Technologically advanced handheld devices, like Smart phones, PDAs, Laptops, Tablets and Portable gaming consoles etc.
2. Transactional Database Accesses for M-Commerce Clients, Techniques to facilitate Information Exchange in Mobile Commerce, Information System and Application Issues in Mobile Commerce, The emergence of Location based Mobile Commerce, The need for Mobile based Approaches
3. Managing the Interactions Between Handheld Devices Mobile Applications and Users, Mobile Commerce and Usability, a Landscape Analysis,
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5. Configuring M-Commerce Portals for Business Success, Knowledge Management in a Mobile Computing Context, Multimedia Messaging Peer Mobile Financial Services, Mobile Banking – A Strategic Assessment, Service for Mobile Commerce Applications, Quality of Perception in M Commerce

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UNIT-2

1.TRANSACTIONAL DATABASE ACCESSES FOR M-COMMERCE CLIENTS:

Although conventional database technologies can still serve for applications in this evolving context, some of the techniques need to be adopted to the new environment to take advantage of the characteristics of the mobile environment or to combat the inherent limitations in such an environment.

In this topic we will cover,

- Data base applications **– transaction proceeding.**
- The concept of transaction processing **– accessing multiple databases** staying in mobile computing platform.
- Several **issues** on the broadcast database and the disconnected processing of transactions are also considered.

DATA BASE ACCESS IN A MOBILE ENVIRONMENT:

Classifying the mobile environment based on the computational power of the client device and the bandwidth of the communication network yields four different types of environments.

BAND WIDTH: A range of frequencies within a given band, in particular that used for transmitting a signal.

Units: Analog devices – cycle per second (or) hertz (HZ)

Digital devices – bits per second (bps)

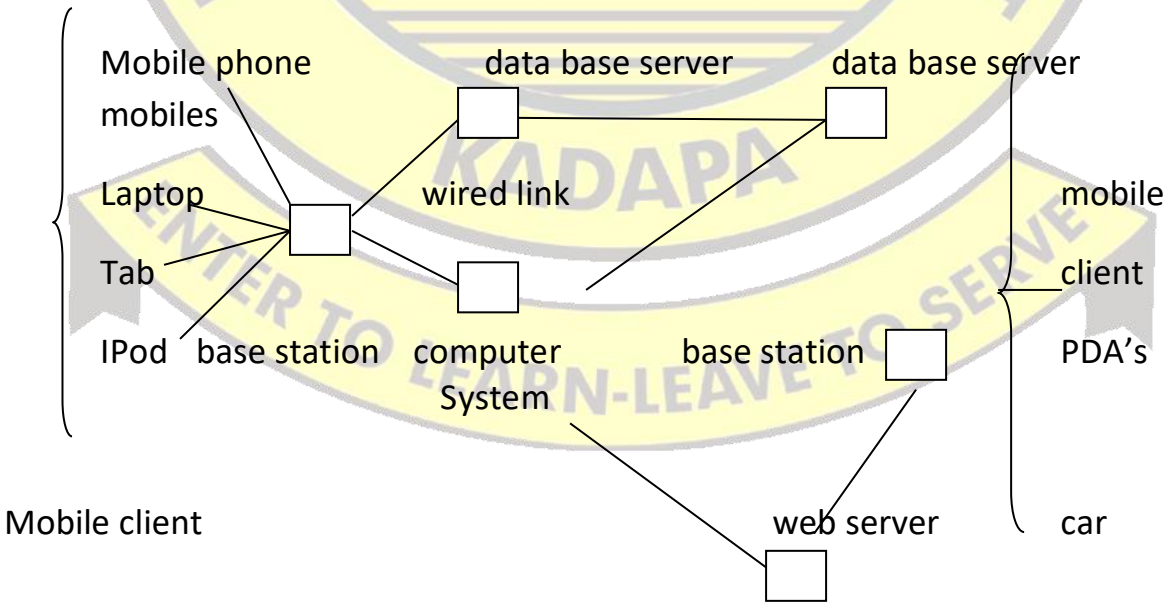
DIFFERENT MOBILE COMPUTING ENVIRONMENT:

COMPUTATIONAL POWER	HIGH	LOW
BANDWIDTH		
HIGH	Laptop under wireless LAN	PDA under wireless LAN or 3G infrastructure.
LOW	Laptop using wireless modem	PDA/WAP device using cellular phone.

The computational model exhibited by laptop computers with a high bandwidth wireless network is almost the same as the conventional distributed computing model except for the added dimension of client mobility.

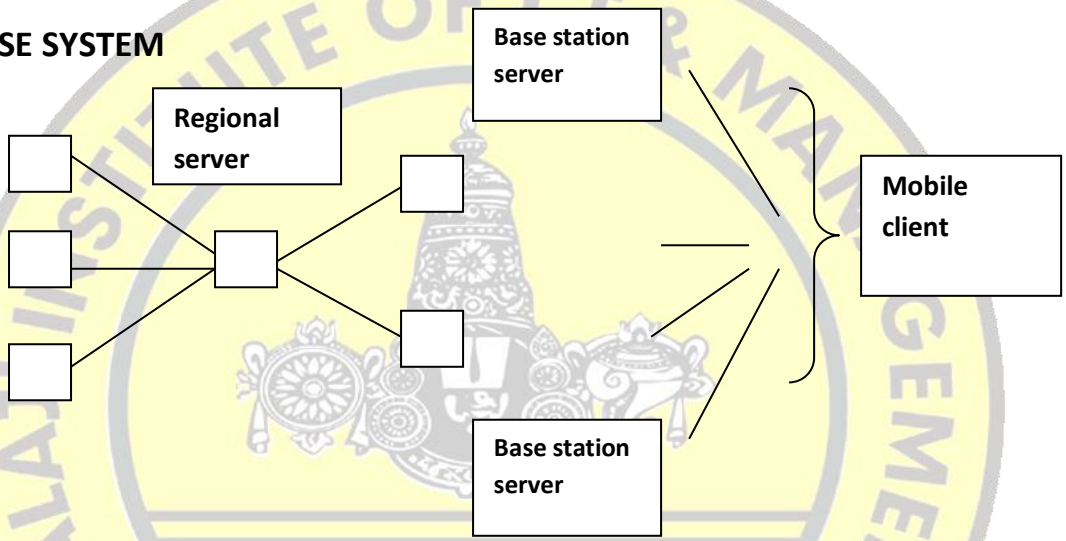
- **Database** is the **core component** in m-commerce.
- Research and application focus should therefore be on the low bandwidth communication environment as well as on the mobility of clients.
- A large client population communicates with various database servers over wireless communication channels.

A TYPICAL MOBILE ENVIRONMENT FOR M-COMMERCE:



There are two base stations that transmit data to and from the mobile clients including laptops, PDA's and WAP phones. The base stations can communicate with a computer system or even with a database system, through a wired network thus enabling the mobile client to access the database system directly.

SYSTEM ARCHITECTURE:



The overall system architecture to support both conventional and global transactions generated by mobile clients in the wireless web-based environment is illustrated in figure. We adopt a geographic-based hierarchical structure for our transaction processing architecture.

There is one base station server (BSS) for each cellular structure and a regional server for a number of neighboring base station servers.

To improve redundancy fault tolerance and load balancing capability of the BSS we could exploit multiple regional servers to organize these BSS in a hierarchical manner.

LOCAL DATABASE SYSTEM:

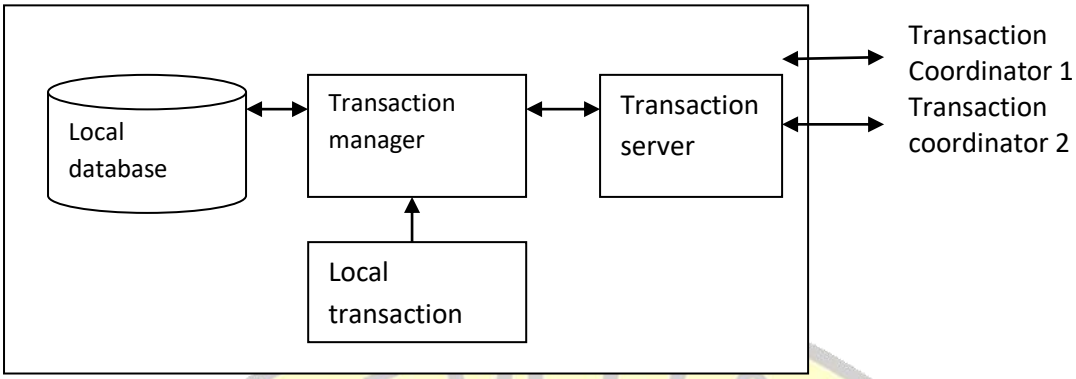


Figure: structure of a database system supporting Global transactions.

A **conventional transaction** that access only one single database is referred to as a **local transaction** in contrast with a **global transaction** that spans across several databases.

- The local database system does not see any other system component beyond the transactions coordinator.
- Transaction manager is inherently built-in component and a local database system receives and processes operations for local transactions that originate from within its own organization.

REGIONAL SERVER:

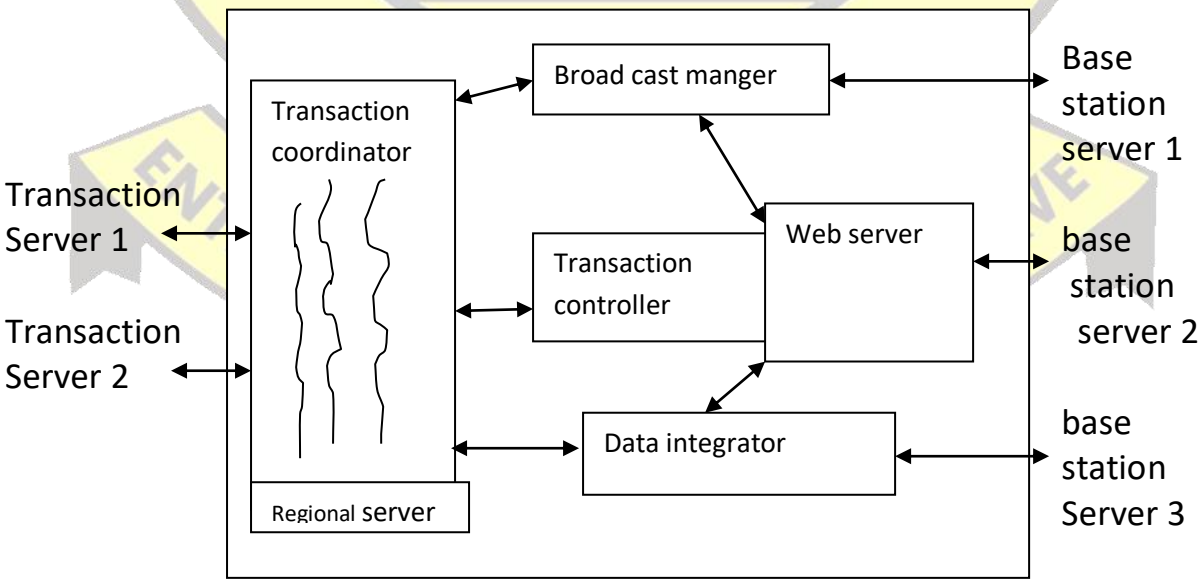


Fig: Structure Of Regional Server

BASE STATION SERVER (BSS):

- BSS is responsible for communicating with the mobile clients through the web based interface.
- A laptop mobile client has a higher computational power and can also interface with the BSS through standards HTTP using HTML or even XML web pages.
- However mobile clients only possess a low computational power and can only interact with the BSS.

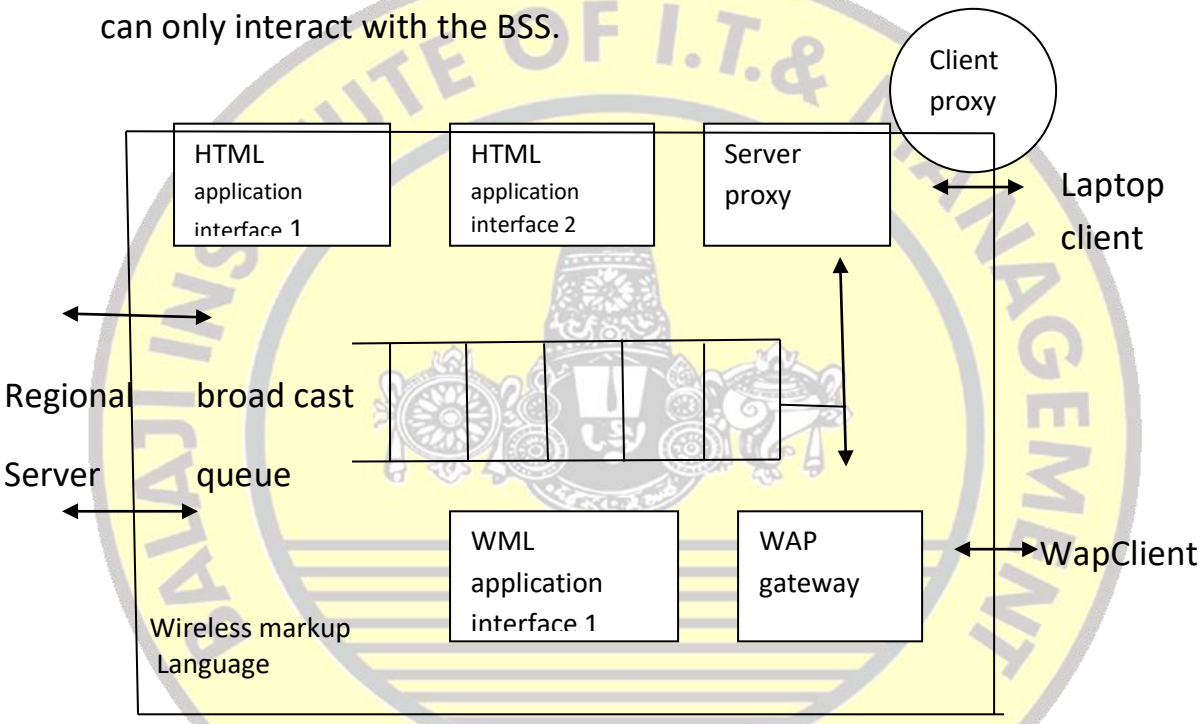


Figure: Structure Of A Base Station Server(BSS)

SUPPORTING GLOBAL TRANSACTIONS FOR MOBILE CLIENTS:

There are two major types of transactions to be supported for mobile clients.

1. Local transactions accessing data in only one local database.
2. Global transactions accessing in several data bases.

Mobile client disconnection and data reconciliation (reuniting, reunion, bringing back together again):

- An additional dimension in transaction processing with mobile clients is the possibility of mobile client disconnection.

- Owing to disconnection they may be unable to relay back those updates to the BSS and then the regional server for validation and instillation.
- Multiple mobile clients conflicting updates to the same set of data items (records) thereby dictating the need for data reconciliation.

  To combat the problem of mobile client disconnection, while holding locks for transactions the locks held on behalf of mobile clients could be like a lease.
- The data integrate at the regional server is responsible for data reconciliation of updates made by mobile clients.

CONCLUDING REMARKS AND CHALLENGES:

- We have discussed the database access in a mobile environment based on different mobile computing environments.
- After that we have discussed about the typical mobile environment for m-commerce and problems in absence of database transactions.
- Then we discussed about system architecture then local database system, regional server base station server (BSS)
- After that how to support global transactions for mobile clients.

2.TECHNIQUES TO FACILITATE INFORMATION EXCHANGE IN MOBILE COMMERCE:

Data management issues related to organizing and retrieving information from wireless channels have posed challenges for the database community.

In this topic we discuss,

1. Data dissemination to mobile clients and present solution that address the bandwidth and energy limitations resulting from short battery life of the mobile units.
2. Techniques to overcome the limitations and provide secure and scalable wireless data dissemination architecture.

AN ARCHITECTURE FOR MOBILE INFORAMATION EXCHANGE:

- In this topic, we present the **broadcasting** in data dissemination.
- We first present a mobile architecture and describe the parameters.

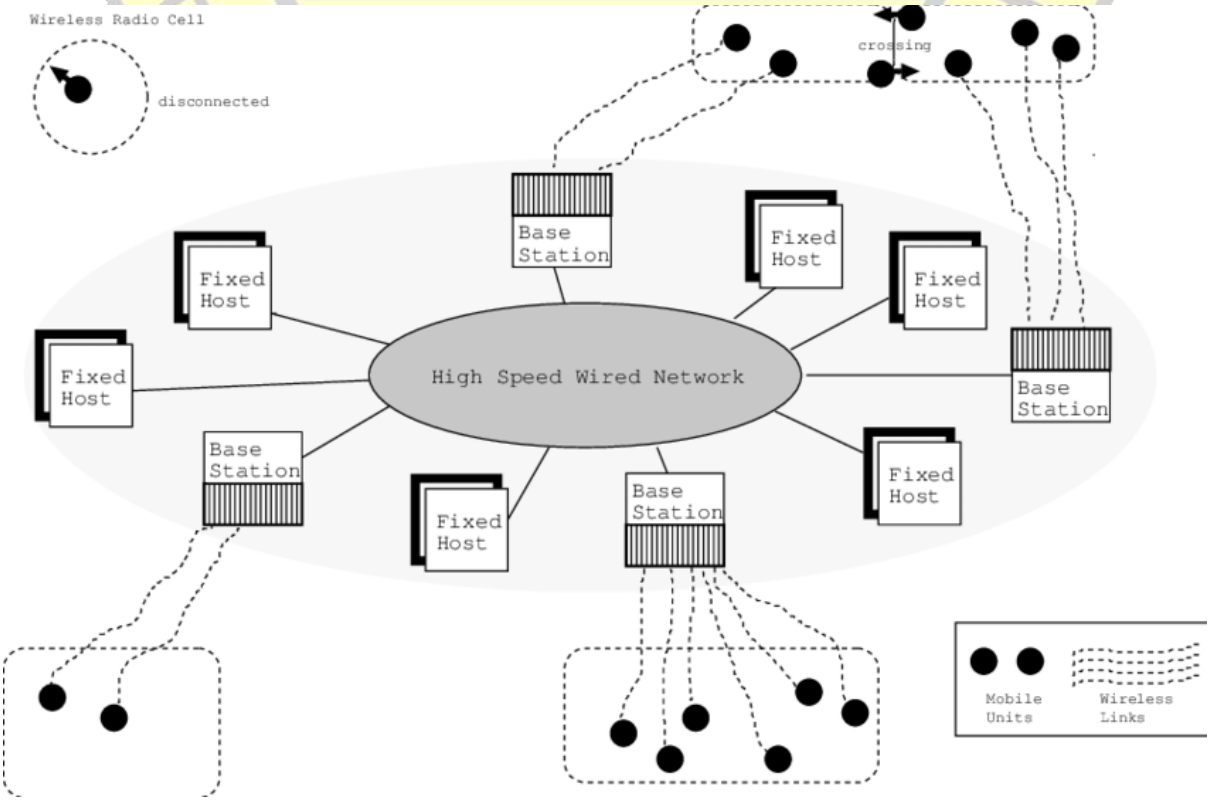
- The two problems that we are addressing in this topic,
  a. The broad casting problem
  b. The subscription-based data access problem

MOBILE ARCHITECTURE:

A general architecture of a mobile platform was given by **DUNHAM AND HELAL** as shown in the figure below.

- It is a distributed architecture where a number of computers fixed host and base stations are interconnected through a high speed wired network.
- **FIXED HOST** – are general purpose computers which are not equipped to manage mobile units.
- **BASE STATIONS** – are equipped with wireless interfaces and communicate with mobile units to support data access.

Figure: A general architecture of a mobile platform



The base stations are identified as servers.

DATA BASE ARCHITECTURE AND ITS CHARACTERISTICS:

- The data in this application is characterized as rapidly changing;users often query server to remain up to date.
- More specifically, they will often want to query the server for their data item of interest.
- **Examples of this type of data are,**
  Stock, weather, and airline information.
  We assume the following for fully characterizing our mobile database.

1. The database is updated asynchronously i.e. by an independent external process.
   Example – stock, weather etc.
2. Users are highly mobile and randomly enter and exit from cells. There is a parameter called residence latency (RL) which characterizes the average duration of a users stay in the cell.
3. User's reference behavior is localized.
   Example – some stocks are more popular than others.
4. Servers are stateless.

BROAD CASTING PROBLEM:

- Wireless networks differ from wired networks in many ways.
- Database users over a wired network remain connected not only to the network, but also to a continuous power source.
- Thus response time is the key performance metric.
- In a wireless network, however both the response time and the active life of the user's power source (battery) are important.
- **Active mode**: while a mobile it is listening or transmitting on the line.
- **Doze mode (stand by):** not actively listening on the channel.
- Clients expend significantly less energy in doze mode than in active mode.
- Therefore one of the major goals of our scheme is to minimize the amount of time a client must spend in active mode to retrieve the data items requests.

We are also interested in the question of retrieval strategies: what are the good retrieval algorithms by which users can retrieve/download data from the server, with a minimum of energy expenditure?

The basic idea is one of "mixed broad casting" i.e. automatic as well as on-demand broadcasting.

ACCESS TIME (AT): Access Time refers to the time elapsed between query submission and receipt of the response.

TUNING TIME (TT): It is the duration of time that the client spends actively listening on the channel.

The meaning of these terms is illustrated in figure consider a client who submits a request at time T0 and receives the response time T7.

AA = TT= T7 – T0

On the other hand, if the client slips into doze mode intermittently, then TT is noticeably less then AT, significantly reducing battery usage.

In this case, AT = T7 – T0 and TT = (T7-T0) + (T5-T4) + (T3-T2) + (T1-T0).

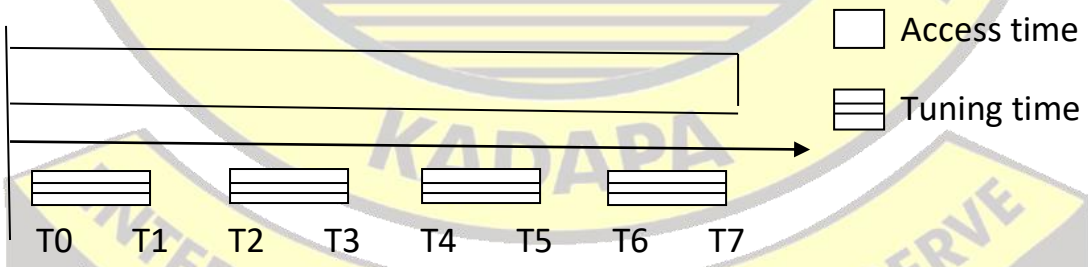


Fig: Access and Tuning Time

This result in energy conservation as the client is in active mode for only short periods of time.

SUBSCRIPTION- BASED DATA ACCESS PROBLEM:

We address another critical problem :providing secure access control in broadcast schemes.

- To get a feel for this problem ,consider the classical broadcast environment, where an information server broadcasts to large number of clients using a shared channel.
- Subscription refers to a contract that each client enters into with an agent, which entitles the client to access a data object for a specific period of time.
- Once the contracted period for a subscription is over,the subscription is considered to have expired and the client cannot access the data object any longer without re subscribing.
- Therefore ,broadcast protocols should provide adequate security and should scale well with the number of clients using the system.

To Enable The Deployment Of Such Appliations The Following Funcitonalities Are Necessary:

1. A client must only be able to access the data items that is subscribed to. In other words,the access to all items that a client is not subscribed to must be blocked.
2. The protocol must be scalable i.e. increasing the number of clients should not deteriorate the quality of service.
3. It should provide adequate level of security.

SOLUTIONS FOR SECURE DATA ACCESS FROM BROADCAST:

The two protocols that provide secure data access form the broadcasts by the clients.

a. **Subscribe**
b. **Drop groups**

Both protocols rely on a security layer supported by the communication infrastructures.

PROTOCOLS TO SUPPORT SECURE DATA ACCESS FROM BROAD CASTS:

The protocols use encryption techniques to scramble the communication between the data server and client.

Two types of encryption keys,

a. **Client keys**
b. **Data keys**

We focused on disseminating data in wireless networks and on accessing the data security. We use **data broadcasting** as the means for data dissemination.

We also point out that the assumption of unlimited battery power for database queries is challenges due to short lived batteries of the mobile units.

A broad cast disk (BD) involves the determination of a broadcast program containing all the data items to be disseminated and the subsequent transmission of this program in a periodic manner.

CONCLUSION AND FUTURE RESEARCH DIRECTION:

We discussed the architecture for mobile information exchange, mobile architecture, database architecture, broad casting problem, solution is mixed broad casting, subscription based data access problem, solutions for secure data access from broad cast, protocols to support secure data access from broad casts.

The broad casts should be prepared considering the current and near future demands of the clients. for example, assume that the broadcasts are prepared based on the requests of the clients within a geographic area. When new clients come into that broadcast area, their items of interest may not be included in the current broadcast. Then, these clients will have to resubscribe to the broadcast and wait until these items are broadcast.

However, keeping track of client movements is both costly and difficult to manage. Therefore ,tradeoffs between premptively including the data items in the broadcasts and managing the location information of the clients must be considered.

We have started researching this area, we plan to derive analytical solutions that optimize bandwidth utilization and cost of operating the system.

3.INFORMATION SYSTEMS AND APPLICATIONS ISSUE IN MOBILE COMMERCE:

INTRODUCTION

MIS refers to a larger infrastructure, whereas IT is one component of that infrastructure that is used for collecting and transmitting data.

For example, IT could be a particular interface that helps users input data into corporate MIS operation.

The special issue on wireless information systems (IS) and mobile commerce (M-Commerce) in information systems and e-business management.

- Some mobile systems are virtually disappearing from our view and becoming embedded in the objects that we interact with on a daily basis.
- The wireless information systems that we have today are enabled by sophisticated IT, including mobile interaction devices and the networks that support communications between them.
- Attention also quickly turned to problems of integrating wireless networks with the existing wired internet and its technologies and then problems of wireless internet access.
- In addition since bandwidth hungry multimedia applications can become even more problematic when used on mobile networks.
- The evolution of wireless and mobile systems is also seen through changing conference.
- Based on our observations of the increasing number of wireless information systems we expanded our scope and named the mini-track" wireless IS", m-commerce and beyond.
- Separate mini-track called "m-commerce and location based services" that reflected the increased use and importance of location in IS and services.

  Finally an entire mini track called wireless with three mini tracks covering,

  a. M-commerce
  b. Mobile services

c. Ubiquitous mobile IS

A Whole new set of issues and problems arise with wireless applications.

Basics – definition of e-commerce and m-commerce.

Examples Of Wireless Is And M-Commerce Applications Include:

A. Inventory systems in which stock clerks use special-purpose wireless devices to check inventory.
B. Police systems that allow officers to access criminal databases from wireless laptop computers in their patrol cars.
C. Trucking information systems with which truck drivers can check information on their loads destinations and revenues using mobile phones.
D. E-commerce systems in which shoppers can use wireless handheld computers to comparison shop.

IS AND APPLICATIONS ISSUES IN M-COMMERCE

1. Security in mobile commerce
2. Location management issue
3. Limitations of mobile devices
4. Ethics and privacy
5. Wireless infrastructure
6. Usability
7. Legal and regulatory challenges
8. Consumer trust
9. Interoperability and compatibility
10. Goals
11. Maintenance
12. Usability (small screen, keyboard)
13. Changes in client needs
14. Technical limitations (insufficient bandwidth, 3G liscenses, lack of standardized security protocol)
15. WAP limitations (speed, cost, accessibility)

4. THE EMERGENCE OF LOCATION OF BASED MOBILE COMMERCE:

LOCATION BASED SERVICE (LBS):

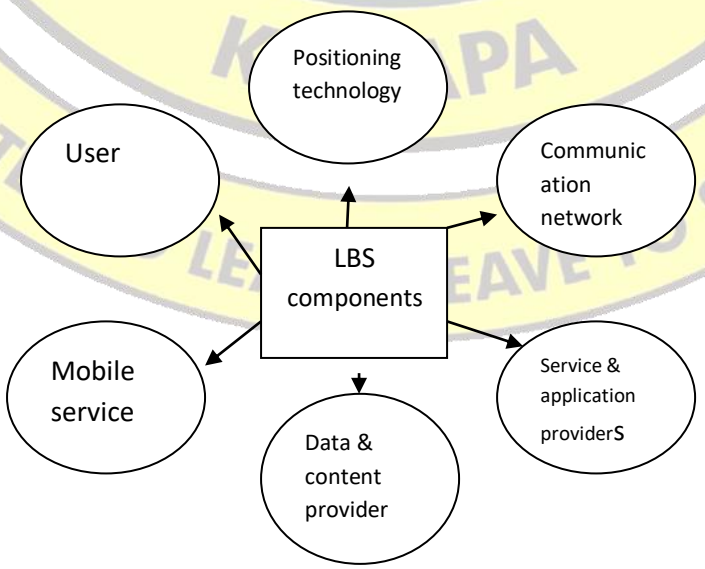
- A LBS is a software level service that uses location data to control features.
- LBS use real time data from a mobile device or smart phone to provide information entertainment or security.
- Some services allow consumers to check in at restaurants, coffee shops, stores, concerts, and other places or events.
- LBS use a smart phone GPS technology track a person's location if that person has opted-in to allow the service to do that.

USES OF LBS:

Companies have found several ways to use a device's location,

1. Store locators
2. Proximity based marketing
3. Travel information
4. Fraud prevention
5. Mobile workforce management
6. Road side assistance (accidents control)

LBS COMPONENTS:



LOCATION BASED MOBILE COMMERCE (L-COMMERCE):

MOBILE COMMERCE: transactions targeted to individuals specific locations at specific times.

LOCATION COMMERCE: Determining the basic position of a person or a thing.

1. **NAVIGATION**: plotting a route from one location to another.
2. **TRACKING**: monitoring the movement of a person or thing.
3. **MAPPING**: creating maps of specific geographical locations.
4. **TIMING**: determining the precise time at a specific location.
5. **LOCATION:** example, automatic vehicle location (AVL) social location - based marketing.

TECHNOLOGIES: Providing LBS involves several technologies.

a. **PDE (POSITION DETERMINING EQUIPMENT)**
Identifies location of mobile device.

b. **MPC (MOBILE POSITIONING CENTRE**)
A server that managers the location info from PDE.

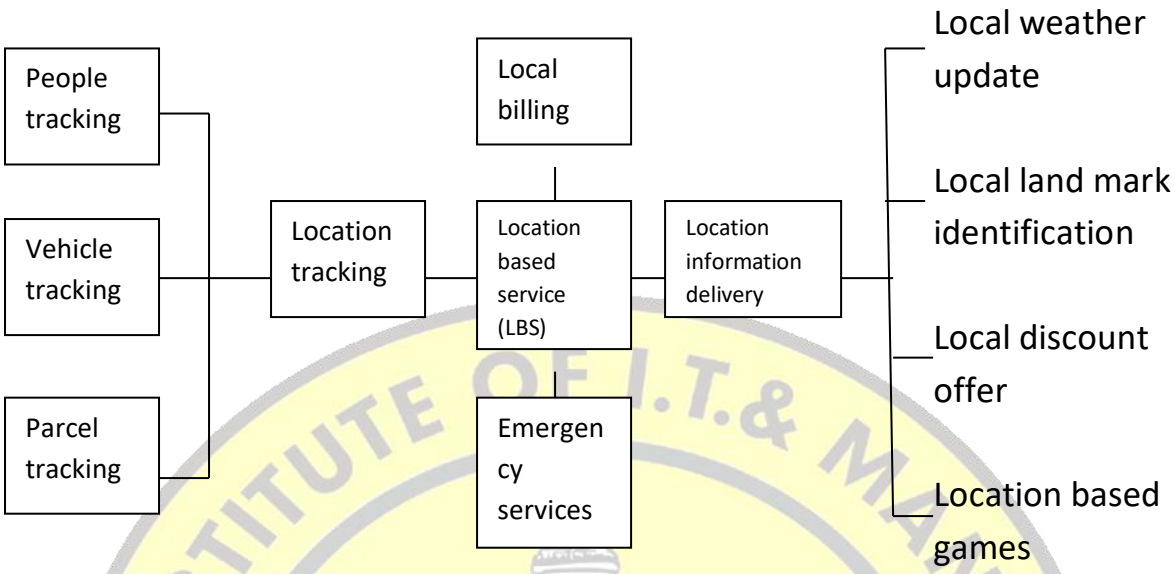
c. **GIS (GEOGRAPHIC INFORMATION SYSTEM)**
Geographic contents consist of streets road maps, addresses, and point of interest.

d. **LOCATION SPECIFIC CONTENTS**
Used in conjunction with geographic content to provide the location of particular services.

BARRIERS TO LOCATION BASED M-COMMERCE:

1. Lack of GPS in mobile phones.
2. Accuracy of devices
3. The cost-benefit justification
4. Limited network bandwidth
5. Invasion of privacy.

Fig: Location Based Services



THE EMERGENCE OF LOCATION BASED MOBILE COMMERCE

INTRODUCTION

- In the emerging m-commerce economy, the knowledge of the position of given service subscriber making a call is gaining particular interest among mobile operators who can, in turn provide innovation location based services (LBS) typically with the assistance of third parties such as services or content providers.
- The pioneers of LBS were basic tracking services and automated vehicle location (AVL).

LOCATION TECHNOLOGIES FOR MOBILE COMMERCE:

- One or more location methods can be used to determine the position of user equipment for LBS.
- The main categories of positioning methods are in order of increasing accuracy.
- Methods of LBS
  - Internal (indoor locations)- Bluetooth.
  - External

- Location techniques operate in two steps
  a. Signal measurement
  b. Location estimate computation.
- Position techniques can be categorized into several varieties.
- The main types are cell location
  a. Advanced network based
  b. Satellite based positioning

CONCLUSION: Thus we discussed the location based services uses of LBS components, L-COMMERCE, technologies, barriers to location based m-commerce and finally the emergence of location based mobile commerce.

5.THE NEED FOR MOBILE BASED APPROACHES:

MAIN PURPOSE OF A MOBILE PHONE:

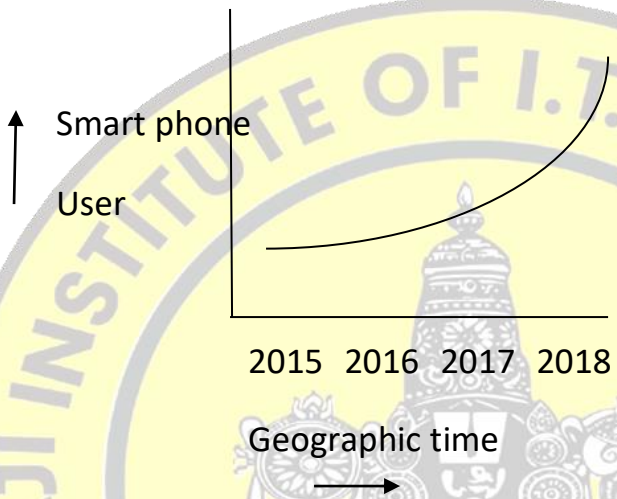
The earliest smart phones let users access email, and use the phone as a fax machine, pager and address book. In recent years the purpose of the cell phone has shifted from a verbal communication tool to a multimedia tool,often adopting the name, mobile device rather than being called a phone at all.

NEED OF MOBILE PHONE/DIFFERENT FUNCITONS OF MOBILE PHONE:

1. It can let you read books
2. It can let you read scientific articles
3. It can let you watch YouTube videos
4. It can let you operate different toys and tools
5. It can let you access emails
6. It can let you browse websites
7. It can let you record important information through your camera.
8. It can let you modify camera picks
9. It can Make complex to do notes
10. It can Help you stay in touch with people miles away through whatapp
11. It can let you to lookup dictionaries quicker.

NEED FOR MOBILE BASED APPROACHES:

- The first and most important reason you should care about mobile commerce is simply the fact that more and more people now own smart phones and tables and connect to the internet using these devices.
- Smart phones usage has consistently grown over the past few years.



E marketer also increased to a lot worldwide will online via mobile.

1. Increased mobile internet usage
2. Increased exposure to customers
3. Keep up with competitors
4. Appeal to a affluent audience
5. Relatively low development cost
6. Increased sales
7. Opportunities to drive users into local stores
8. Appeal to comparison shoppers
9. More people have smart phones
10. Mobile commerce fits with your business model

BENEFITS OF M-COMMERCE APPS:

MC apps brings more sales

MC apps get you more customers

App users grow more connected to brands

Keep customers engaged

Smart phones make mobile shopping easier

Mobile saves you money

Social connections improved

CONCLUSION:

Thus, the main purpose of mobile phone, need of mobile phone, need for mobile based approaches benefits of m-commerce apps were discussed briefly.

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MC (SYSTEMS PAPER) HR & SYSTEMS SPECIALIZATION

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UNIT-3

1. MANAGING THE INTERACTIONS BETWEEN HAND HELD DEVICES ,MOBILE APPLICATIONSAND USERS:

1.1 Introduction:

In this work we present the problem of managing the interactions between handheld devices, mobile applications and users that are the three main entities involved in providing information access in the mobile scenario.

Some techniques to overcome the constraints imposed by hand held devices during the interaction with users and mobile applications.

1. **HAND HELD DEVICES**: EXAMPLE: PDA, mobile phones etc.
2. **MOBILE APPLICATIONS**: Among this which can possibly be considered for implementation, i.e., Web Search Engines which are useful to end users who seek information for work.
3. **USERS**: There are different categories of mobile users looking for information resources to solve some emergency needs.

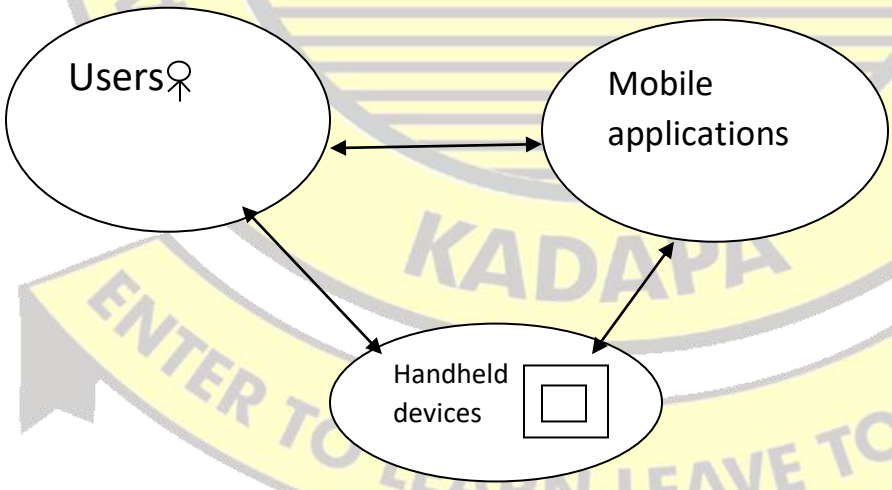


Figure: Main Entities Involved In The Mobile Computing Scenario

- Several problems need to be addressed in the use of handheld devices to present information and to adapt information content available on the web.
- It is necessary to provide the user with a tool that allows him to find and reach relevant sites.

1.2 Motivations of Managing The Interactions Between Handheld Devices, Mobile Applications And Users:

- Write about E-Commerce & M-Commerce & their differences.(BASICS)
- Due to their (E-Commerce & M-Commerce) unique features, the handheld devices could become a bottle neck in accessing E-Commerce services – not allowing the user to fully appreciate the information & services offered by E-Commerce sites.
- To overcome limitations of handheld devices – content adjustment that refers to the information presentation techniques.
- Evolution of wireless communications devices.(BASICS)
- Risk & cost awhile content adjustment.
- Scope of E-Commerce(BASICS)
- Using content adjustment, allowing more effective B2B(Business to business) & B2C(Business to Customers) interactions.
- Finally 3G introduced by "ANY TIME ,ANY WHERE, ANY DEIVICE."

1.3 Design Alternatives For Overcoming The Constraints Of Handheld Devices:

We now analyze the handheld device features that constrain the design of a mobile application (search engines) and which need to be addressed by **CONTENT ADJUSTMENT**

1. Screen size
2. Input method
3. Wireless link
4. Small memory
5. Slow CPU (central processing unit)
6. Energy consumption

Explanation:

1. **SCREEN SIZE:**

   In desktop computer – (480-640) pixel ;where as in PDA(Personal Digital Assistance) - 160 pixels

- This means only 1/12 of the webpage can be displayed on the PDA.
- Now a days many web browsers for handheld devices display WebPages without considering their screen sizes.
- Thus, pages do not fit property onto those small screens and web surfing becomes very tedious.

In Order To Address These Problems, Various Approaches Can Be Adopted:

A. **Device – specific authoring**
   - Reduce the amount of content in a page.
   - Place key information at the top.
   - Verify long text do not exceed screen dimension.
   - Menu bars-at a fixed place

B. **Multiple – device authoring**
   - Top level heading –Bold.
   - Defines the mapping from a single source.
   - Document to a set of rendered documents that apply to the different target devices.

C. **Client – side navigation**
   - Allows the user to navigate interactively with in a single page ,modifying a portion of it that is displayed at a time.

D. **Automatic re authoring**
   - Requires development of software

2. **INPUT MEHTOD:**

- Initially in PDA, characters are written by the user in a special area of the screen and are recognised by OCR(Optical Character Recognition).
- **GESTURES** : Implemented gestures with pen are more varied than those of mouse.
- **WORD COMPLETION TECHNIQUES:** employed to manage text input problems.

- **PO Box**: (Predictive cOmposition Based On eXample)
- Finaly proposed a way to introduce words by pressing keys only once.
- SPEECH RECOGNITION

3. **WIRELESS LINK**:
   In 1G & 2G, there is a problem of transfer data because bandwidth available is very low.
   - Link of client & server is very low & does not allow large data transfer.
   - All above problems can be overcome by 3G
   - Write evolution of wireless technology (BASICS).
4. **SMALL MEMORY**: A hand held device has a small amount of memory, and it is impossible to manage complex pages, such as a page containing a large image/high amount of data.
5. **SLOW CPU:** The CPU in mobile devices is quite slow and computational intensive operations should be avoided as otherwise the user has to wait far too long.
6. **ENERGY CONSUMPTION**:
   Battery energy needs to be saved in order to guarantee the autonomy of the device, and this is a constraint for the operations that can be done on the client, since the CPU operations are expensive in terms of energy **consumption.**

1.4 Mobile Search Engines (MSE):

- Gerard Salton is the father of modern search technology.
- Odysseus is the name of our project for designing and implementing an MSE.
- Search engines are often used to discover and find information on the web.

The user could utilise a search engine on handheld devices for the following reasons:

1. To choose between services offered, including those of M-Commerce, and to find one which best satisfies his needs.
2. To retrieve information of every day interest for work & pleasure.
   A. **DIRECTLY LEGIBLE DOCUMENT**: If the size of the document is not too big, it can be displayed directly on the hand held devices screen, after a content adjustment phase.
   B. **NOT DIRECTLY LEGIBLE DOCUMENT**: If does not allow for online reading, the search result can be sent to a workplace capable of managing the resource.
   C. **PRINTABLE DOCUMENT:** If the user has a portable printer, he can immediately print the search result and use it, even if the search result is not easily readable on a screen.

The study of searching by means of handheld device should not be limited to Search engines(SE) but should be extended to Information Retrieval Systems (IRS) generally and Digital Libraries(DL)s.

1.5 Odysseus: An example of an MSE

In order to understand all the problems related to the development of search engines for use on handheld devices, it seems important to underline the most relevant key features for their design. In 2001 a proposal called ODYSSEUS was introduced.

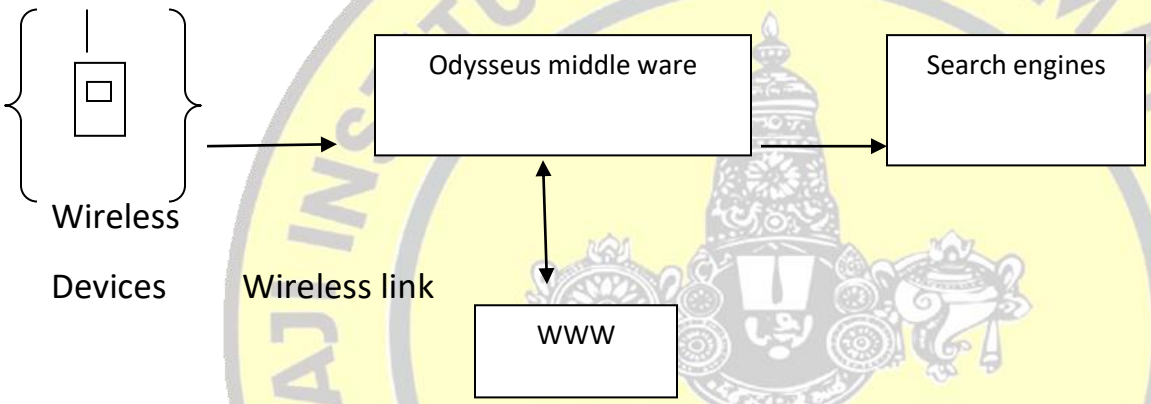


FIGURE: ODYSSEUS ARCHITECTURE

- ODYSSEUS is organized according to client-server paradigm.
- The client sends user's query to the middleware server, which forward to selected search engine & search result was displayed on the client.

1.5.1 Functionalities of Odysseus Middleware Server:

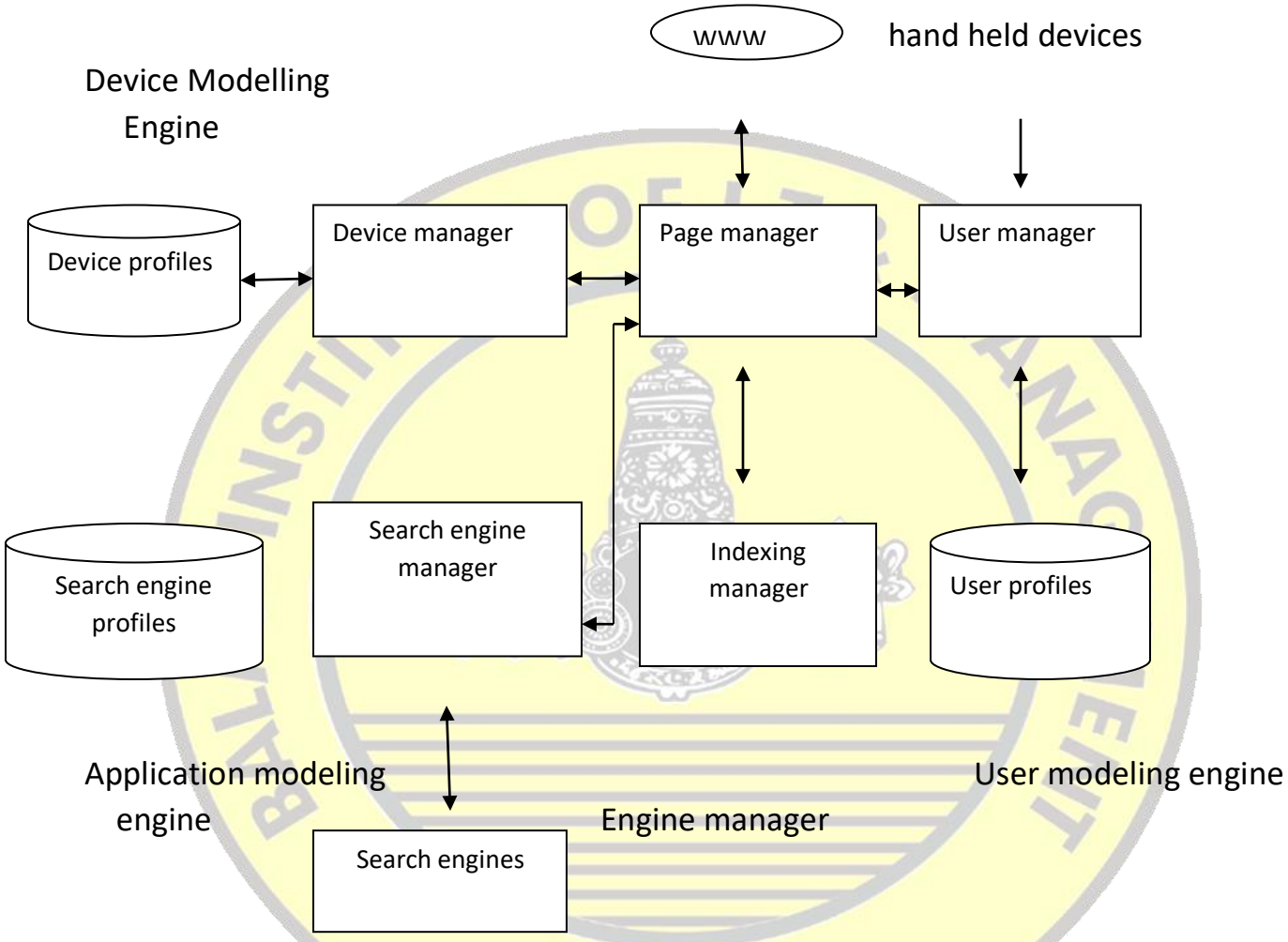


FIG: ARCHITECTURE OF ODYSSEUS MODULES

Four Main Functional Modules Are:

1. Hand held devices (Device Modeling Engine)
2. Mobile applications (Applications Modeling Engine)
3. Users (user modeling)
4. Engines managers – It is a supervisor & co-ordinates the interaction of the other modules.

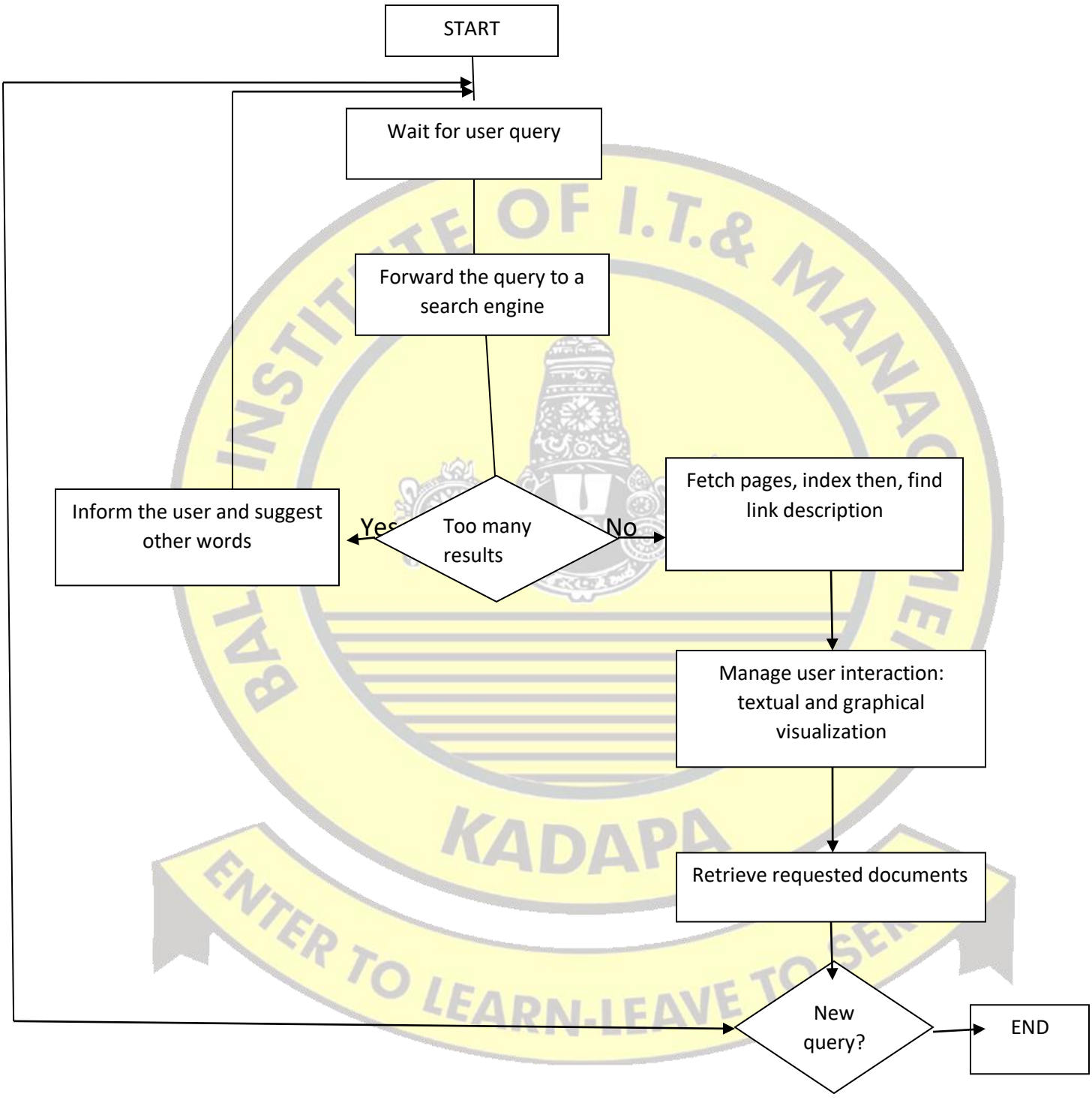
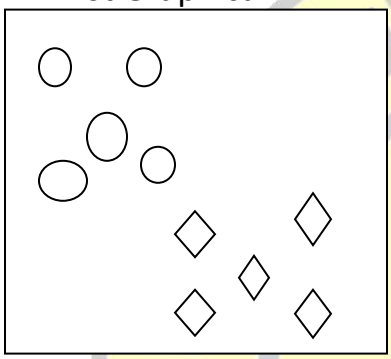


FIGURE: Tasks executed by odysseus middleware server

1.5.2 Result Visualization:

1. **Textual visualization**(description of a link)
2. **Graphical visualization (**operates by offering the user the choice between various methods of visualization and allowing him to move from one to another, once an object of interest is selected ,odysses shows the link description, as in texual visualization.

First Graphical



Second Graphical

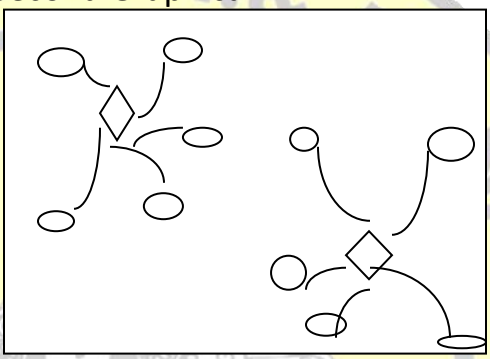
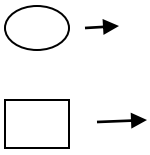
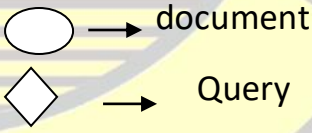


Fig: visualization of inter document similarities & Document clustering

Fig: visualization of relationships result & **query.**





Third Graphical

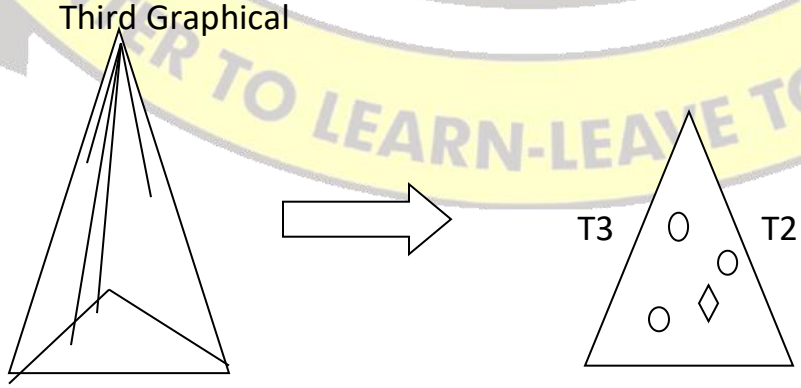


FIGURE: 3-terms query & three results.

CONCLUSION: we have described the problems of managing the interactions between handheld devices, mobile applications & users.The project of extending the use of pervasive devices leads to the concept of content adjustment. needed for various reasons,

- Anytime, anywhere, any device-3G
- Legacy applications should be used on handheld devices to extend an enterprises business opportunities.

2. MOBILE COMMERCE AND USABILITY:

In this topic, wee analyze the critical issues confronting for M-Commerce applications.

- Limited Bandwidth & Multiple Form Factor pose constraints for user interface design in terms of the amount & format of content presentation, navigation & site structure.
- Future Research in these areas are needed to improve the usability of M-Commerce.

2.1 Introduction:

USABILITY: It refers to how well an application is designed for users to perform desired tasks easily & effectively.

Usability issues involve:

1. User interface design
2. Methods for development
3. Testing and
4. Deployment

- M-Commerce has not yet resulted in expected growth.
- Even with the latest phones in Japan, consumers still find small screen display and small buttons on these devices difficult to use.
- Main objective of this topic is to provide a critical analysis of usability issues confronting the interface design ,development, deployment & adoption of M-Commerce applications.

2.2 M-COMMERCE:

Write Definition, history, product & services, scope of E-Business (B2B) Basic of M-Commerce.(BASICS)

2.3 Usability Research For E-Commerce:

Usability gauges the quality of a users experience in interfacing with a product or system, be it a website, a software application, mobile technology or any user-operated device.

- Generic usability principles have guided the development of E-Commerce applications.
  A. Ease of learning (how fast can novice learn)
  B. Efficiency of use (how fast he accomplish task once used past)
  C. Memorability (can past user remember to use next time)
  D. Error frequency & severity (how serious is errors and how easy to recover from error)
  E. Subjective satisfaction (how much does the user like using the system)

Usability has gained increasing attention in E-Commerce website engineering & also suggest a broad set of design guidelines.

1. **HOME PAGE:** Web pages should be clean and not cluttered with text and graphics. Horizontal scrolling should be avoided.
2. **NAVIGATION:** Text on links should be descriptive and self explanatory. Links to another product-related website should be direct.
3. **CATEGORIZATION**: Products should be categorized meaningfully with no more than three levels in depth.
4. **PRODUCT INFORMATION**: Accurate, consistent & detailed descriptions of products should be provided along with full pictures. The size of products should be shown in measurable & comparable way.
5. **SHOPPING CART**: There should be a link directing the customer back to the page he/she left in order to resume shopping.
6. **CHECKOUT AND REGISTRATION:** The vendor should only ask for necessary and meaningful information, such as name & address, not asking marketing questions. Customers should be allowed to browse the site without logging in.
7. **CUSTOMER SERVICE:** customers should be provided with a toll free telephone numbers on every page of the site.

2.4 Usability Research For M-Commerce:

- Usability Research on wireless applications has usually focused on addressing the design constraints imposed by Bandwidth Limitations & Small Display of handheld devices.

- Diverse Form Factor offer different functionalities and have different interface requirements.
- Many usability problems, such as long download and broken connections, information overload and excessive horizontal and vertical scrolling are common to all three form factors.

They Recommend Eight Guidelines:

1. Avoid scrolling
2. Use a flat hierarchy
3. Design a navigation system.(Consistent with a regular web browser).
4. Design a back button.
5. Provide a history list.
6. Provide an indication of signal strength.
7. Reduce user's memory load
8. Limit the search scope to improve search efficiency.

2.5 KEY ISSUES:

Based on the above review, we identify five issues concerning user interface for M-Commerce in the following areas:

1. Technology
   A. Limitation of band width
   B. Form factors
2. Goals and tasks
3. Content preparation
4. Application development
5. Relationship between M-Commerce and E-Commerce.

These issues correspond to the four socio technical components in the wireless telephony system.

Those are Hardware, Software, And Netware & Bizware.

Explanation:

1. **TECHNOLOGY ISSUES**
   Band width: Amount of data that can be transmitted in a fixed amount of time.
   Form Factor: hand held device size, shape ,style ,layout.

a. **LIMITATION OF BAND WIDTH**: The data rate for mobile communication is much lower than regular modems.

- The connection to the wireless service base station is unstable because signal strength changes from place to place, especially on a move.
- This limitation has several implications for the interface design of mobile applications & devices.
- **THE AMOUNT OF INFORMATION EXCHANGED BETWEEN THE DEVICE & THE BASAE STATION SHOULD BE LIMITED**: Lengthy text messages & graphics are not suitable for mobile applications. A large amount of information takes longer to download, & the download process can be interrupted by broken connections.
- **INDICATION OF THE DOWNLOAD PROGRESS IS NECESSARY**. Due to lower data rates the download process on a mobile device is significantly longer than on a regular desktop. Most participants felt frustrated & frequently quit the process. So, indicating download progress can held users to have a better sense of control.
- **TRANSLUCENT CASHING CAN BE HELPFUL**: In the presence of disconnected/weakly connected operations, novice users could perform almost as well as experienced users. Providing feedback about connectivity may reduce user frustration & enhance perceived usefulness for mobile users.
- **FRIENDLY RECOVERY FROM BROKEN CONNECTIONS IS ESSENTIAL:**
  If the connection between the mobile device & its base station is broken during the process of receiving or sending information, the device or the application must be able to resume the process once the connection returns.

b. **FORM FACTOR:** mobile commerce services are accessible through multiple platforms. These platforms use different operating system (OS) & offer different functionalities.Iinterface design for different platforms varies.

Some Popular Platforms Are:

- Wireless PDA devices using palm OS
- Pocket PCs running Microsoft window CE/pocket PC OS
- WAP phone
- Two way pagers (RIM(Research In Motion) can both send and receive information from the base station)

2. USERS GOALS AND TASKS:

E-Commerce – users can fully focus on their tasks/spend hours of time.

M-Commerce—only limited time & cognitive resources for performing a task, meeting time critical & spontaneous needs (such as flight schedules, checking stock prices)are more useful for M-Commerce users.

Projected market shares of different activities on mobile devices:

ACTIVITIES	MARKET SHARE IN 2005(%)
Data transfer	22
Short messaging	9
Location services	5
Games & Gambling	2
Ads	1
E-Business	1
Shopping	1
Daily news service	0.5
Voice calls	60

3. CONTENT PREPARATION:

Designing a wireless application is fundamentally different from designing a website because of the limited screen space and bandwidth.

The depth of a wireless websites, structure, navigation and format will require different design guidelines.

A. Amount of information
B. Navigation
C. Depth of site structure
D. Graphics or text

4.DEVELOPMENT ENVIRONMENT:

Methods for mobile application development & usability testing should also be re-examined.

- Functionalities of complex wireless application have to be distributed across multiple wireless infrastructures, platforms & form factors

- More research is needed to examine new approaches for mobile application development that consider user interface issues in the context of the whole system architectural & functional complexity.

2.6 Relationship Between M-Commerce And E-Commerce:

Write about E-commerce and M-commerce (BASICS)

Four factors make the mobile internet an ideal channel to implement Customer Relationship Management (CRM).

1. Its ability to personalize content and services.
2. Track consumers/users across media & over time.
3. Provide content & service at the point of need and
4. Provide content of highly engaging characteristics.

The challenge is the co-ordination of user interfaces and contents across multiple channels so the experienced users and repeat customers can handle multiple media and plat-forms with satisfaction.

Write about technological issues in M-commerce(unit 1)

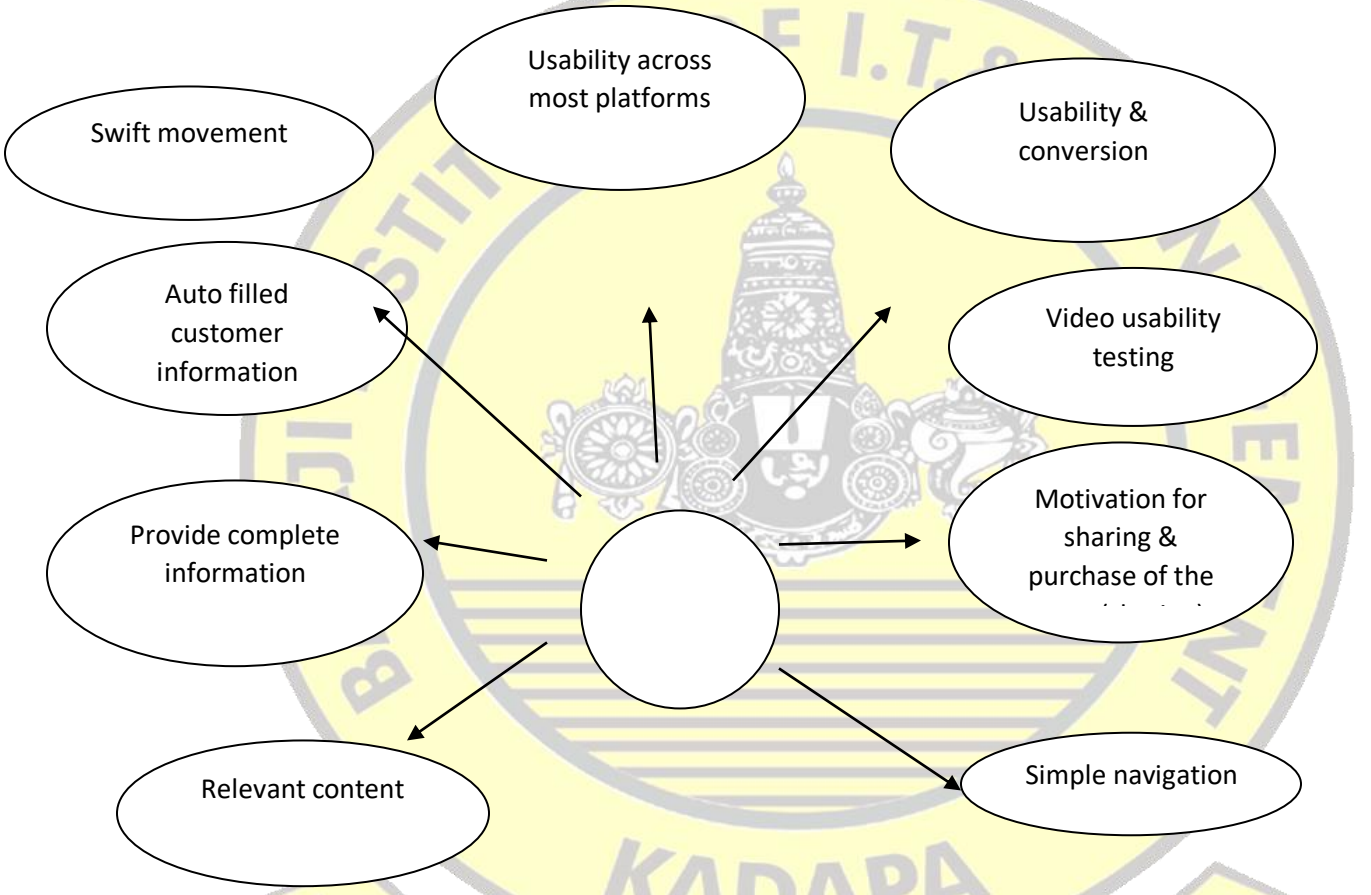
CONCLUSION:

In this topic, we have identified the constraints, challenges and opportunities for usability issues affecting the adoption of M-Commerce.

2.7 Research is urgently needed in the following areas:

1. **BAND WIDTH LIMITATION**: How should wireless applications and hand held devices be designed to remedy the bandwidth problem?
2. **FORM FACTORS**: how should wireless applications be designed for different form factors?
3. **TASKS**: What tasks are most suitable for M-Commerce applications?
4. **CONTENT PREPARATION:** How should the navigation system re designed for wireless applications? How should a wireless site be structured to facilitate information retrieval?
5. **DEVELOPMENT METHODOLOGY:** How should wireless interface designed be incorporated into the development of distributed, multichannel system?
6. **M-COMMERCE APPLICATIONS:** what criteria should be considered to guide the mapping of E-Business strategies, tasks, and technology choice for wireless applications.

2.8 USABILITY ASPECTS OF M-COMMERCE APPS:



2.9 USABILITY PROBLEMS IN TODAYS HOTSPOTS:

1. Login process
2. Time limited credentials
3. Hotspot selection
4. Internet downtime
5. Network latency

2.10 USABILITY FOR M-COMMERCE ACROSS MULTIPLE FORM FACTOR:

Category of tasks	Wireless site/tasks		
	Category of websites	Wireless site	task
Transactional tasks	Travel	Travelocity United airlines	Booking a flight Booking a flight
	Retail	Amazon E bay	Buying a book Bidding on a item
Information retrieval tasks	Portal	Yahoo Excite	Searching a movie Searching a movie
	Financial	Fidelity E trade	Checking a stock quotes Checking a stock quote
	Travel	Travelocity United air lines	Checking a flight schedules Checking a flight schedules
	News	ABC News The wall street journal	Searching top news Searching top news

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(17E00307) MOBILE COMMERCE

Objective: The objective of the course is to describe M-commerce system concepts ,to critically analyze examples and cases of M-commerce systems and to examine some of the applications in M-commerce

1. Current Status and Future Trends in Mobile Commerce, Technology Issues in Mobile Commerce, Mobile Commerce Systems, Mobile Ecommerce on Mobile Phones, Technologically advanced handheld devices, like Smart phones, PDAs, Laptops, Tablets and Portable gaming consoles etc.
2. Transactional Database Accesses for M-Commerce Clients, Techniques to facilitate Information Exchange in Mobile Commerce, Information System and Application Issues in Mobile Commerce, The emergence of Location based Mobile Commerce, The need for Mobile based Approaches
3. Managing the Interactions Between Handheld Devices Mobile Applications and Users, Mobile Commerce and Usability, a Landscape Analysis,
4. Mobile marketing, mobile ticketing, mobile computing, mobile payments and mobile banking vis-a-vis latest technologies (wireless and mobile communication technology, digital cellular technology, mobile access technology and 4G and 5G systems
5. Configuring M-Commerce Portals for Business Success, Knowledge Management in a Mobile Computing Context, Multimedia Messaging Peer Mobile Financial Services, Mobile Banking – A Strategic Assessment, Service for Mobile Commerce Applications, Quality of Perception in M Commerce

Text Book:

- Advances in Mobile Commerce Technologies, EE-Peng Lim, KengSiau, Idea Group of Publishing

Reference Books:

- Mobile Commerce Applications, Shi, Nansi, Idea Group of Publishing
- Mobile Commerce, KarabiBandyopadhyay, PHI

UNIT-4

MOBILE COMMERCE

1. MOBILE MARKETING:

DEFINITION OF MOBILE MARKETING: A set of practices that enables marketers to communicate and engage with their target group in an interactive way through and with any mobile device or network.

- Mobile marketing is promotional activity designed for delivery to cell phones, smart phones and other handheld devices, usually as a component of a multi-channel campaign.
- Traditional marketing out dated waste of money and time (newspaper, radio etc.)

We will get great source of income.

FACTS:

1. Mobile marketing is the future, millions of mobile phones are sold every year and text messaging is the most popular form of communication.
2. 50% of local searches are done on mobile device, this means that people are looking for your products and services.

3. 29% of mobile users are willing to scan a mobile tag to get coupons providing instant coupons directly to your customers mobile device (gift card)

NEED TO DEVELOP:

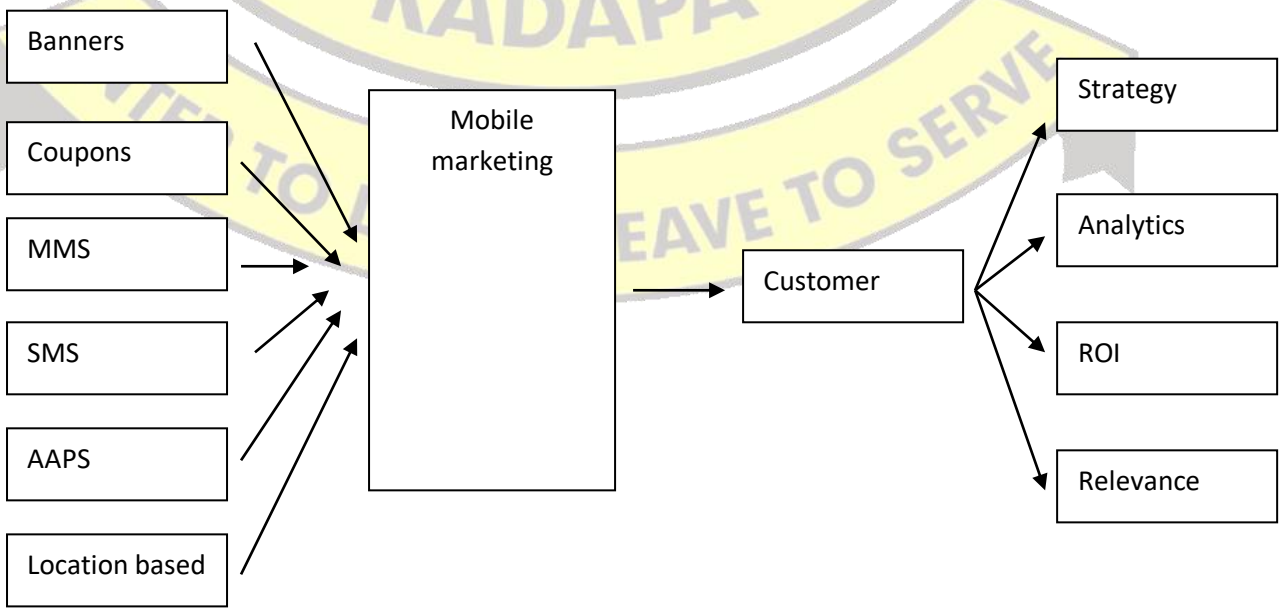
1. Design and development
2. Advanced technologies
3. Wide range of products and services
4. Excellent customer service
5. Proven marketing strategies and resources

BENEFITS:

1. Mobile marketing is a multi channel digital marketing strategy.
2. It allows interactions with customers.
3. High reach
4. It is really measurable marketing strategy
5. Allow message (SMS) marketing's
6. Apps
7. Easy to work with

DEMERITS:

1. Lack of standardization in mobile device technologies
2. Privacy and permission
3. Questionable navigation
4. Platform too diverse



MMS – multi messaging service

SMS – short message service

2. MOBILE TICKETING:

Mobile ticketing is the process that allows mobile users to purchase tickets for various events and journeys through their mobile devices.

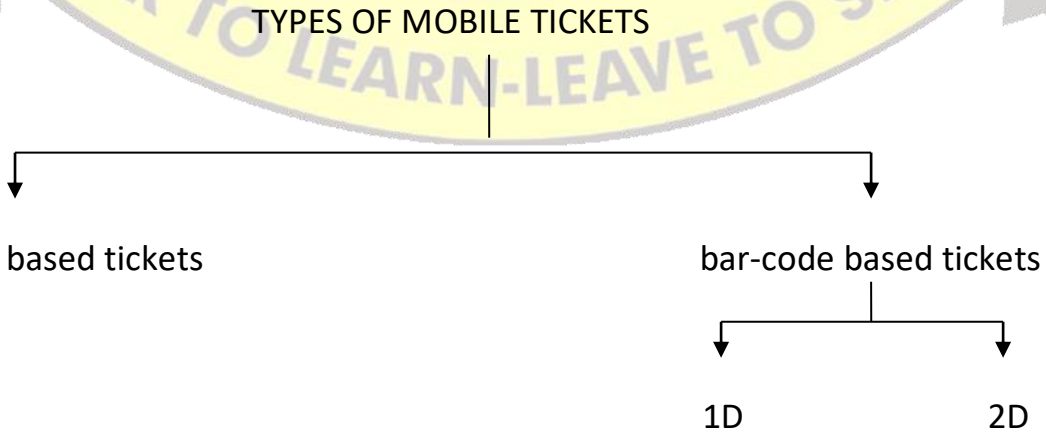
- The user can order for airline tickets, train tickets, bus tickets, movie tickets, games from their mobile devices.
- The mobile tickets are directly delivered to their mobile devices either in the form of SMS or a barcode.

MERITS

- Eliminate use of paper tickets (paperless)
- Simplify ticket delivery process
- Avoid printing and postage
- Low cost
- Convenience.

MOBILE TICKETING PROCESS:

1. Enquiry about the availability of tickets
2. Pricing information
3. Selection and ordering of tickets
4. Payments – credit/debit card
5. Receipt of tickets
6. Redemption of the ticket at the venue.



1. **SMS BASED TICKETS:**

- These are simplest form of mobile tickets that consist of simple text message describing ticket number and other details such as data of journey.
- Digital signatures are often attached to the SMS tickets to avoid duplication / fraud.

2. **BAR CODE BASED TICKETS:**

ONE-DIMENSIONAL (1D): It consists of up to 7 digits in length and is similar to those found in retail items sold in departmental stores.

TWO DIMENSIONAL (2D):

Also called as DATA MATRIX

- It consists of multiple rows of unique data which are up to 16 characters in length.
- 2D codes area capable of storing more information than 1D code.
- 2D codes are extensively used by prominent mobile ticketing companies such as MOBIGA, TYNTEC, and GAVITEC etc.

MOBILE TICKETING PROCESS:

- **Purchase**
- **Delivery**
- **Scanning and redemption**

All the above stages can be performed through mobile devices without the need of any desktop computers.

1. **PURCHASE:**

Mobile tickets can be purchased in a variety of ways such as

a. Through SMS
b. WAP browsers
c. Online purchase

A. SMS

- The SMS consists of a short code indicating a particular type of a ticket
- Customers send SMS for booking travels or event tickets to a particular service number of the respective organizations.
- In response the vendor sends an SMS denoting the availability of the ticket and asks for payment.
- The customer pay through SMS based mobile payment system.
- Mobile ticket delivered to the customer mobile in the form of text message.

B. WAP BROWSERS

- Here customer logs on to the WAP website of the organization from their mobile phones and select mobile ticketing option from the website press purchase button. The system responds with a message denoting the availability of the ticket and asks for payment.
- The customer can pay using credit/debit card based online payment, pre-paid wallets, direct debit or SMS based premium billing options. Then finally ticket is delivered in the form of 1D or 2D barcodes.

C. ONLINE PURCHASE

Customers must login to the vendor website from a desktop or tap lap or create an user account for purchase mobile tickets. Next users will have to select ticket type and payment mode and press purchase button. Then finally mobile tickets will be delivered to the user mobile phone after receipt of payment.

2. DELIVERY:

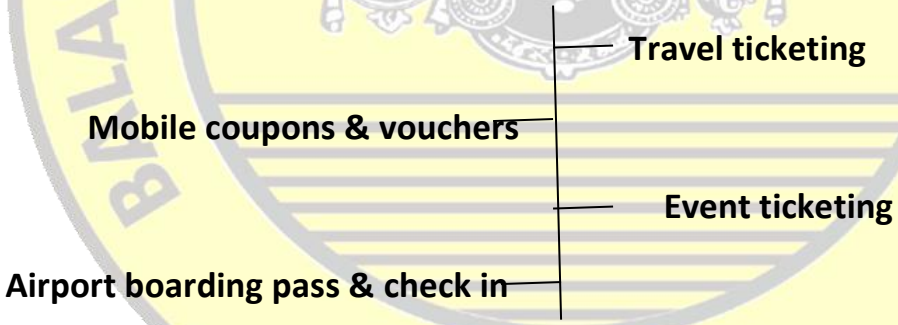
- Once the payment for mobile ticket is made, the ticket will be delivered in the mobile phone of the customer.
- Deliver in the form of,
- Alphanumeric text message
- 1D barcode
- 2D barcode.
- For SMS enabled cell phones – ALPHANUMERIC
- WAP enabled cell phones – 1D or 2D.

1D BARCODE 2D BARCODE

3. SCANNING AND REDEMPTION:

- In case of SMS - guard at the gate will visually inspect the ticket and allow user inside.
- In case of BARCODE based ticket – the guard uses laser scanner to scan barcode.
- The scanner can be in-built inside the gates and can wirelessly send the ticket data to a central server.

APPLICATIONS OF MOBILE TICKETS



1. TRAVEL TICKETING:

Mobile tickets are widely used in various mass transit systems including bus journeys, train travels and airline ticketing systems.

- Improve customer convenience
- Avoid long lines in ticket booths
- Eliminate paper tickets

In most cases, mobile ticketing system is connected to a central server that maintains and updates the ticket database and also can communicate with the customers in a coordinated manner.

2. **EVENT TICKETING:**

- Event organizers can replace paper tickets for trade shows, concerts, movies and other events with mobile tickets.
- The users can order and purchase event tickets from their mobile devices and show it at the venue gates.

3. **MOBILE COUPONS AND VOUCHERS:**

- The discount coupons and vouchers are distributed in the form of mobile tickets, and are sent to the customers mobiles.
- Barcode images of the products can be displayed in printed advertisements which can be scanned by customer's mobile devices to show product details and special offerings.

4. **AIRPORT BOARDING PASS AND CHECK IN:**

- Once the mobile air-tickets are validated, passengers can receive mobile boarding passes that allow then to check-in without standing in long queues in the airports.
- It increases customer convenience and greatly improves ticket validation efficiency.

ADVANTAGES:

1. Reduced cost
2. Reduced time
3. Increased revenue
4. Value-added services

3.MOBILE COMPUTING

- Mobile computing is also known as nomadic computing or ubiquitous computing
- It is defined as a technology that allows all desktop-like computing functions available in small portable devise, which are not connected to a fixed physical link.
- It provides wireless network – anytime, anywhere.
- Thus users can
  - Browse the web
  - Check e-mails
  - Prepare PPT

- Check spreadsheets
- Edit documents
- Download MP3 music
- Watch online movies

- Mobile computing has introduced an extra mobility to modern day business executives by allowing sending/receiving data across wireless networks.

CATEGORIES OF MOBILE COMPUTING DEVICES:

1. Lap tops and notebooks.
2. Tablets and e-readers
3. Smart phones
4. Portable gaming devices
5. Ambient or pervasive computing devices.

1,2,3,4 – Unit – 1 (last topic)

6. Embedded or pervasive computers are small computing devices containing processor, memory wireless communication interface to transmit/receive information to from surrounding regions.

- They are usually embedded in everyday objects, such as electrical applications, cars, offices, human body, key chains, coffee mugs etc, to provide unobtrusive connectivity and services all the time.
- They automatically collect, process and transmit information in order to adapt to the respective context and activities.
- Thus pervasive computing devices silently work in the background without explicit awareness of the underlying technology and tend to improve human experience and quality of life substantially.

WIRELESS NETWORK ACCESS:

WI-FI, WIMAX, HOTSPOT, CELLULAR MODEM, DATACARD, CELLULAR BROAD BAND TECHNOLOGY.

USUALLY, mobile software is developed by transforming existing desktop software into software that can be used in mobile phones / devices.

MOBILE SOFTWARE PLATFORMS:

Java ME, symbian, apple IOS, Google android, windows mobile, BREW, palm OS.

APPLICATIONS OF MOBILE COMPUTING:

1. Transportation industry
2. Hospitality industry
3. Financial sector
4. Emergency services
5. Real estate.

1. TRANSPORTATION INDUSTRY:

- Mobile computing is used in controlling taxi / bus / truck fleet services with the help of a centrally controlled dispatcher.
- Each vehicle consists of a mobile unit that communicates with the central dispatcher and gives full details of their where about and other information's.
- The dispatcher stores and forwards the status information of each vehicle and ensures safe and timely delivery of the vehicles to the customers.

2. HOSPITALITY INDUSTRY:

- In hospitality industry pagers/smart phones are extensively used to send short text messages to various staffs scattered across the entire hotel/hospital building.
- In case of any emergency situations, employees can be summoned quickly to assemble in the crisis point for taking appropriate actions.

3. FINANCIAL SECTOR:

- Mobile computing can help accessing real time stock information in environments, such as factory warehouses or remote plant locations where normal access to stock is very limited.
- Mobile users can receive up dated stock news through handheld mobile devices using internet.
- Regularly updated (stock was) by mobile users at regular intervals.

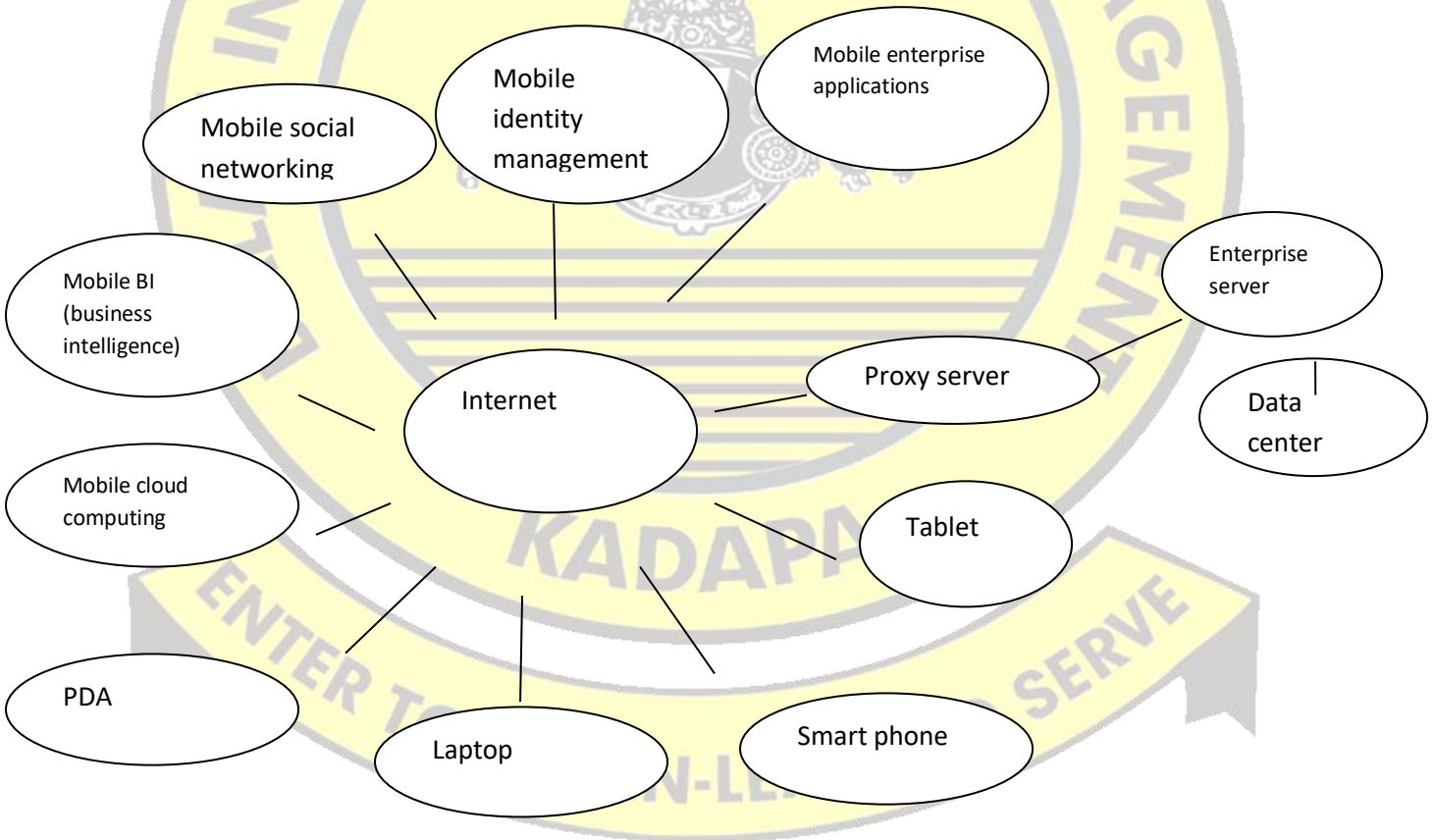
4. EMERGENCY SERVICES:

- Ability to send / receive information from moving vehicles plays a vital role.
- The information regarding the place, time, type and other details of an incident can be sending instantly from a mobile device at the point of occurrence.
- The instant messaging about the also helps in averting further damages by sending alerts to people in the surrounding region.

5. **REAL ESTATE:**

- With mobile computing devices they can obtain current real estate information by accessing multiple websites.
- They can provide clients with immediate feedback regarding specific homes or neighborhoods.
- They can also apply for loans directly from their mobile devices can get loan approvals on the spot in their mobile devices.
- Thus mobile computing allows them to devote more time to their clients, and hence, increases their productivity and profitability.

BUSINESS APPLICATIONS OF MOBILE COMPUTING:



MOBILE BUSINESS INTELLIGENCE:

- It is a technique by which large amount of critical business data are accessed through mobile devices and analysis and reporting can be performed in the form of charts and reports.

- More and more companies have started to introduce mobile BI as a part of their marketing strategy to impart higher efficiency of their business processes and for better and faster decision making anytime, anywhere.

MOBILE SOCIAL NETWORKING:

It is a technology that allows mobile users to connect with one another through their mobile devices, share information photo and other documents.

MOBILE IDENTITY MANAGEMENT:

- Mobile identify is the process of authenticating a mobile user using the SIM card stored in the mobile device.
- In order to authenticate using the SIM card, user has to enter a secret PIN number issued by the network operator for mobile identification purpose.
- E-health programs, e-books.
- A number of different service providers, organizations, business processes and payment institutions are involved in these mobile transactions and a proper mobile identify management system is required to ensure validity of these transactions between service providers and mobile users.

FUTURE OF MOBILE COMPUTING:

With rapid technology advancements in mobile hardware as software the future of mobile computing seems very promising.

- Artificial intelligence will be implemented.
- Work from home.
- Superfast 4G internet access
- Mobile cloud computing

Thus the low processing power or small storage capacity of mobile devices will not affect the user experience anymore and mobile devices will become more and more efficient and useful as ever before.

4. MOBILE PAYMENT

- Mobile payment is an integral part of mobile commerce where mobile devices such as mobile phones, PDA's or tables are used to initiate and authorize payments for goods and services.

- It is an alternative payment system. (instead of paying cash)
- In order to facilitate financial transactions, mobile payment systems utilize digital currency that constitutes digital bits.
- Special care was taken to maintain the privacy, integrity and confidentiality. (PIN, password authentication)

DIFFERENT TYPES OF MOBILE PAYMENTS:

1. SMS based mobile payment
2. Direct mobile billing
3. Mobile wallets
4. Credit card based mobile payments
5. Mobile WAP payments

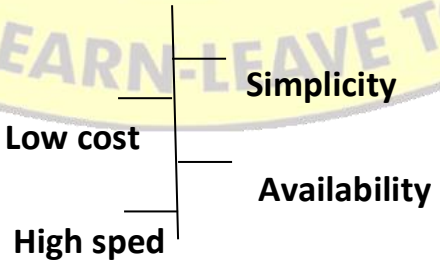
- With 5 billion mobile users, mobile payment has become a natural successor to electronic payments.
- For making,

1. Bill payments
2. Purchasing travel
3. Event tickets
4. Day-to-day grocery items
5. Shopping mall/restaurants

MOBILE PAYMENT OPTIONS:

- Google wallet, PayPal, square, ISIS, M-PESA, MOBIPAY, MCKECK, PAYTEM etc.
- All major banks and financial institutes have introduced mobile banking and mobile payments operations.

CHARACTERISTICS OF MOBILE PAYMENT SYSTEMS



1. **SIMPLICITY:**

- It must be simple and user friendly.

- There must be scope for the customer to personalize the application according to his/her convenience.

2. **AVAILABILITY:**

- It must be universal.
- Users must be able to perform financial transactions in C2C, B2B, B2C models.
  C2C: Customer to customer
  B2B: business to business
  B2C: business to customer

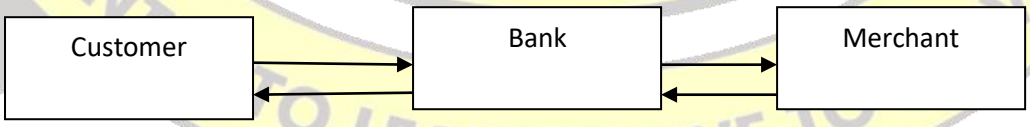
3. **SECURITY:**

- The important and confidential account information of the customer must be protected from misuse by unwanted hackers which may lead to financial and other losses to the customers.
- In order to resist hacker or virus attacks, proper security arrangements must be adopted in the form of firewalls, public key encryption (PKI) technology and password authentication.

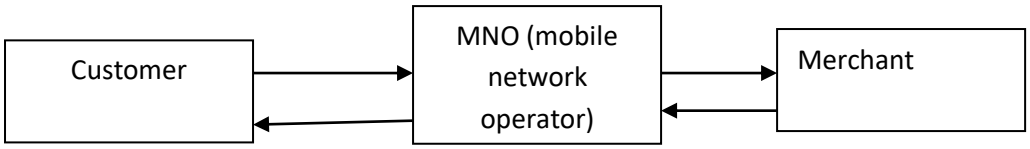
4. **LOW COST:**
   It must be lower than that of other conventional payment systems.
5. **HIGH SPEED:**

- It must be high enough to satisfy business and other customers.
- The mobile network provides financial institutions and mobile. Payment service providers must work together to ensure faster transactions, so that customers find mobile payments most effective and convenient.

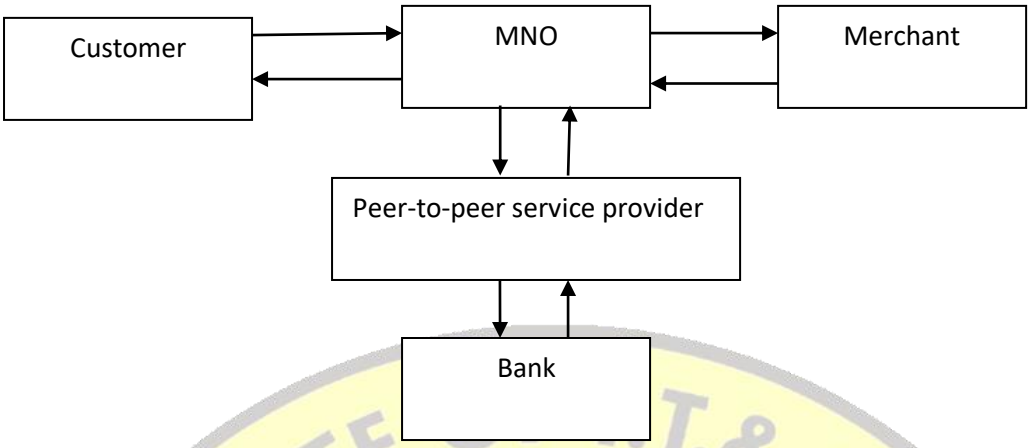
MOBILE PAYMENT MODELS:



A.**Bank – centric model**



B.Operator – centric model



C. Mobile payment models

A. BANK-CENTRIC MODEL:

- The banks control the entire payment stages visa, MasterCard.
- The role of network operators is jut to provide the connectivity for transmitting the payment transactions.
- Instead of using credit cards, consumer's user their NFC enabled mobile devices at the POS terminal and make payments exactly in a similar manner to credit card based payments.

B. OPERATOR-CENTRIC MODEL:

- In this model, the mobile network operator controls the entire value chain of the payment system and provides the mobile payment service to the customer without the involvement of a bank.
- The entire payment network and transactions are maintained by the operators themselves and provide Pos terminals to the merchants for making payment transactions.
- However, the scope of operator-centric model is limited as the network operators are not banks, and hence it is not possible for them to provide wide range of financial services provided by banks.

C. PEER-TO –PEER MODEL:

- In this model mobile payment service providers act independently and offer mobile payment services to the customers.
- They don't involve banks or mobile operators for processing the payment transactions.

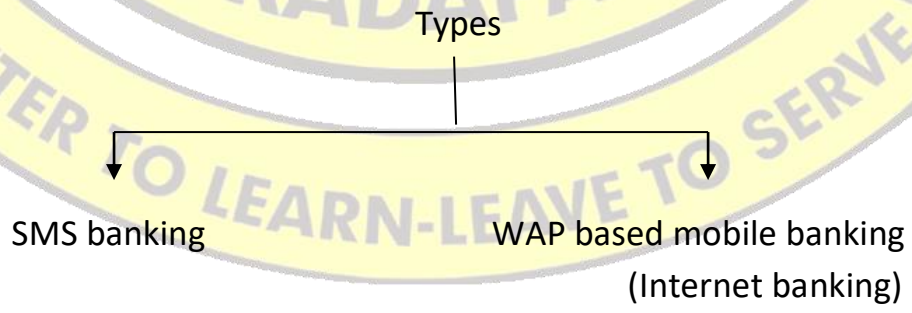
- This model is particularly applicable to individuals who do not own a bank account and is extensively used in emerging countries.
- EXAMPLE: Pay pal and OTO pay.

TYPES OF MOBILE PAYMENTS:

1. Mobile phone-based payments
2. SMS-based transactional payments
3. Direct mobile billing
4. SIM card-based mobile payments
5. Credit card-based mobile payments
6. Smart card-based mobile payments
7. WAP-based mobile web payments
8. Mobile wallets

5.MOBILE BANKING – BANK IN YOUR MOBILE

- Mobile banking is the process of performing banking transactions through a mobile device such as smart phone, PDA or tablet.
- It allows users to access their bank accounts through their mobile devices and conduct normal banking transactions such as balance checking, account transfer, bill payment, check payment “at any time anywhere”
- On registering the mobile number in the bank, the mobile user gets PIN from the bank which is used at the time of performing bank transactions in order to make it secure.



MOBILE BANKING BUSINESS MODELS:

- Mobile banking offers various financial and non-financial banking transactions performed through mobile devices.

- Such online banking transactions are usually processed by BANKING AGENTS through withdrawals, deposits on behalf of the banks or other financial institutions.
- These banking agents have collaboration an integral part of mobile banking.
- Several retail or postal outlets, such as pharmacies, super markets, post offices etc, can act as BANKING AGENTS and conduct on behalf of the banks.

MODELS ARE AS FOLLOWS:

1. Bank-focused model
2. Bank-led model
3. Non-bank-led model

1. **BANK FOCUSED MODEL:**
   In this model the financial institution, such as bank provides banking services directly to its customers through mobile devices.
2. **BANK-LED MODEL:**

- In this model the bank makes collaboration with mobile network operators and mobile device manufactures and provides common mobile banking platforms to mobile users.
- Such branchless mobile banking offers banking either by TELCOS (mobile network providers) or other retail banking agents (such as retail stores.)

3. **NON-BANK-LED MODEL:**
   In this model, the bank and telcos make an agreement to provide a mobile banking platform to the mobile user, but the bank will only provide the funds for a transaction.

MOBILE BANKING TECHNOLOGIES

Service technology **client side technology**

These are stored in a secured server at a bank **these are stored in the mobile handset or embedded inside the SIM card of the mobile handset**

EXAMPLE: SMS banking, WAP application

1. Interactive voice response (IVR)
2. SMS banking
3. WAP (wireless application protocol)
4. Standalone client applications (java)

MOBILE BANKING SERVICES

Mobile banking transaction based services	**mobile banking non-transaction based services**
Found transfer	**weather update**
Micro payments	**news update**
Bill payment	**traffic update**
Tax payment	**security alerts**
Transactions alert messages	**loan request**
Mobile recharge	**bank interest rates**
Insurance premium payment	**email to customer**

ADVANTAGES OF MOBILE BANKING:

1. Anytime anywhere
2. Ease of use
3. Secure
4. Reduced cost

CHALLENGES OF MOBILE BANKING:

1. Cellular coverage
2. Handset compatibility

3. scalability
4. customization
5. securing and reliability

SUMMARY:

- The introduction and rapid spread of mobile phones across the world is perhaps the most remarkable technological phenomenon in recent times.
- Many of these mobile users live in remote location where access to banks is unavailable.
- The mobile financial services are of two types' mobile banking and mobile payments.
- The future of mobile banking lies in integration of mobile banking and micro credit services as it will open new channels to banks and financial institutions, and will help them to reach huge unbanked population having enormous potential and possibilities.

6.WIRELESS AND MOBILE COMMUNICATION TECHNOLOGY

COMMUNICATION SYSTEMS:

These are electronic equipments used to send information in the form of electronic signals from one location to another.

a. Wired communication (physical wires)
b. Wireless communication (microwaves modems)

- Communication networks
  - LAN (local area network)
  - WAN (wide area network)

  LAN – coverage area 100 mts.
  WAN – cover entire country – internet
- The signal used to transmit information from one point to another can be of two types.
  a. Analog signal – continuous signal
  b. Digital signal – discontinuous signal

A. ANALOG SIGNAL:

Whose amplitude or phase/frequency is changed? At the receiving end, the receiver separates or demodulates the information signal from the carrier signal **EXAMPLE**: telephone networks.

(wireless radio networks) audio broad casting

Voice telephony (wired telephone network)
Video broad casting (wired + wireless)

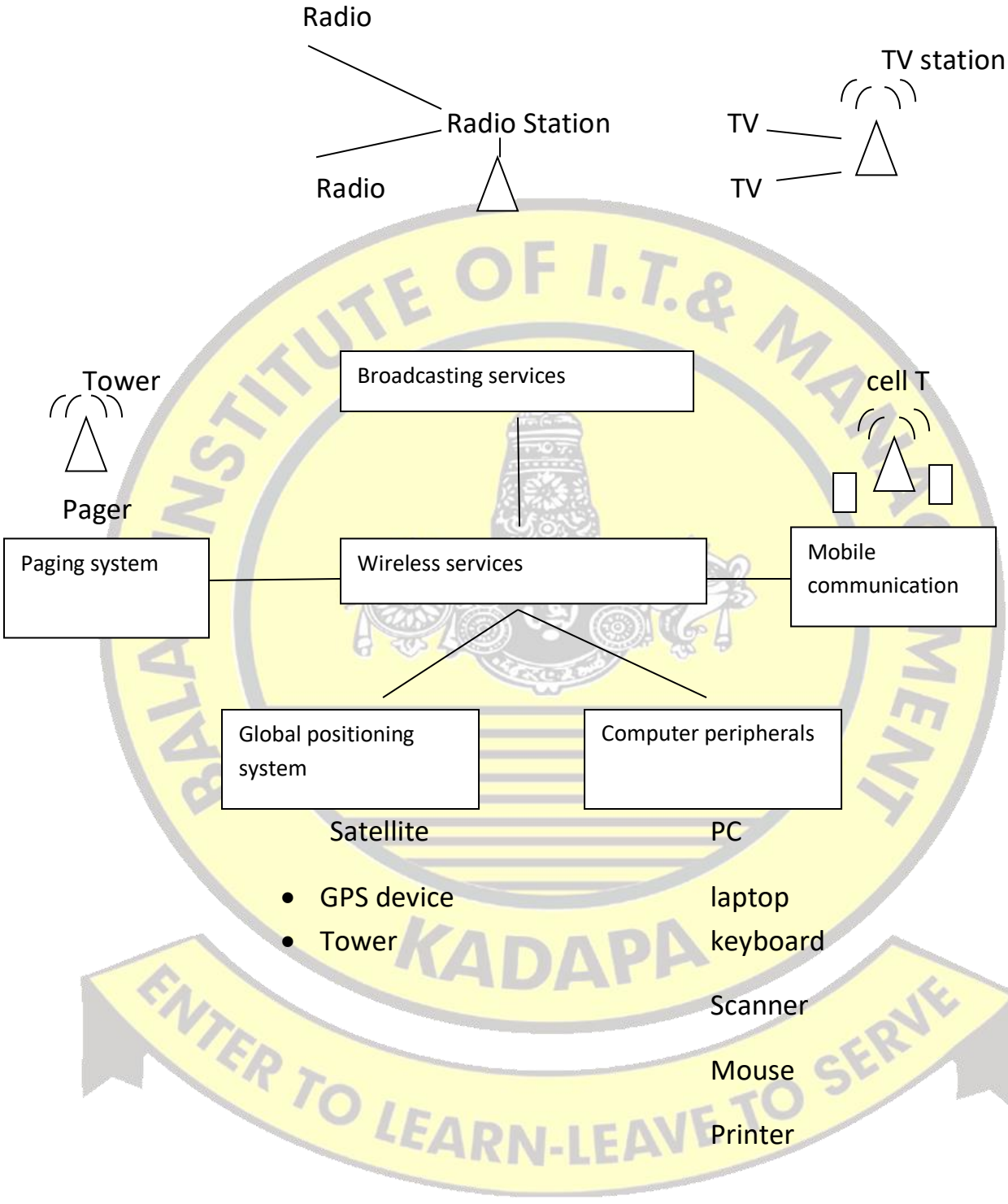
B. DIGITAL SIGNAL:

- Changes from one state to another in discrete steps. It consists of a series of binary pulses.

DIGITAL COMMUNICATION SYSTEMS: it used multiplexing technology that combines a number of analog or digital signals into a single that can be transmitted over a single cable.

- At the receiving end, the reverse process called DEMULTIPLEXING is applied that separates individual signals, which are then delivered to respective parties.
- Thus, multiplexing reduces the cost of data transfer by utilizing the valuable communication channel effectively.
- There are three main types of multiplexing,
  1. Frequency division multiplexing (FDM)
  2. time division multiplexing (TDM)
  3. code division multiplexing (CDM)

WIRELESS SERVICES:



WIRELESS SYSTEM:

1. cordless technology
2. WLAN
3. Wi-Fi

4. Bluetooth technology
5. Bluetooth products

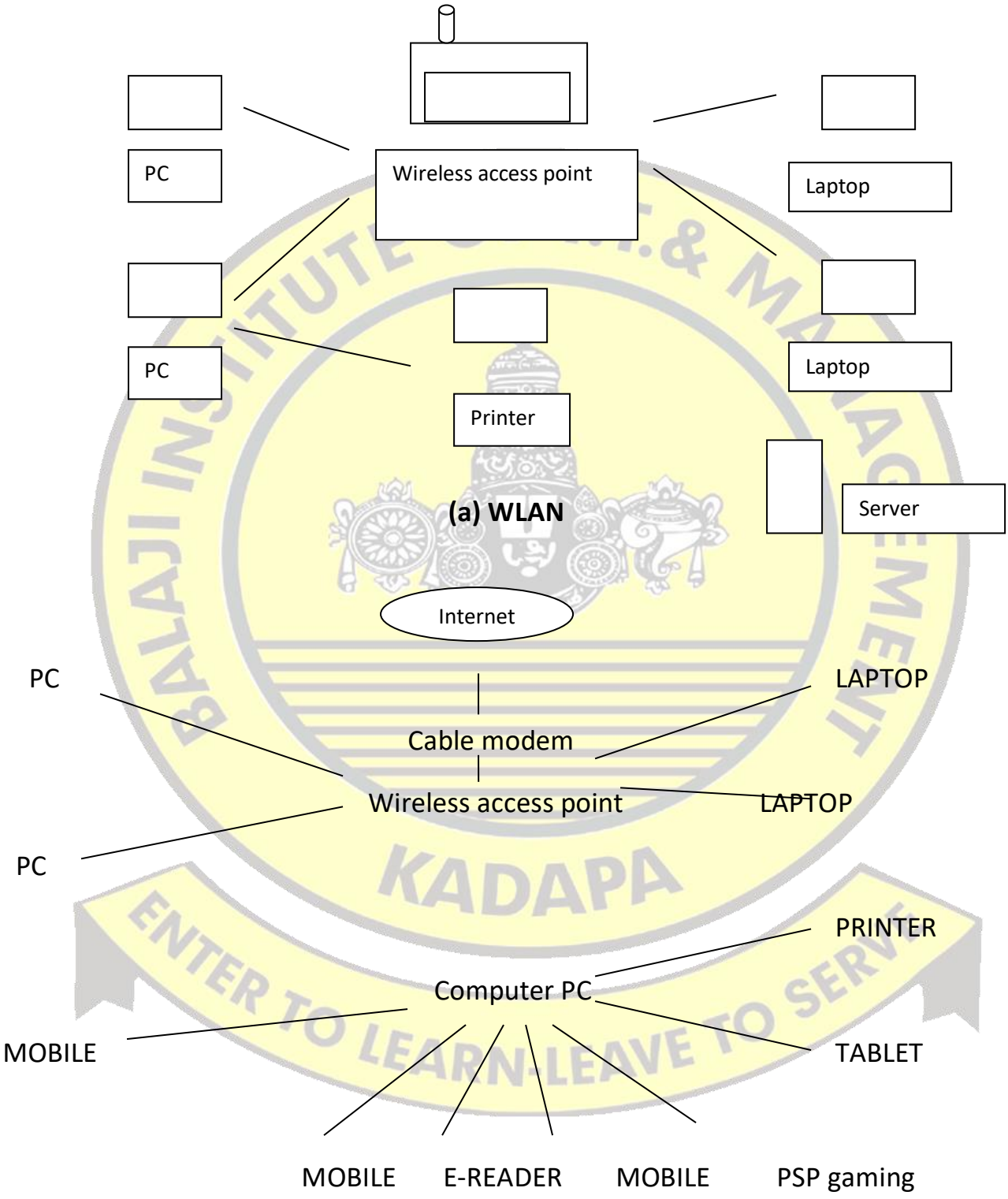
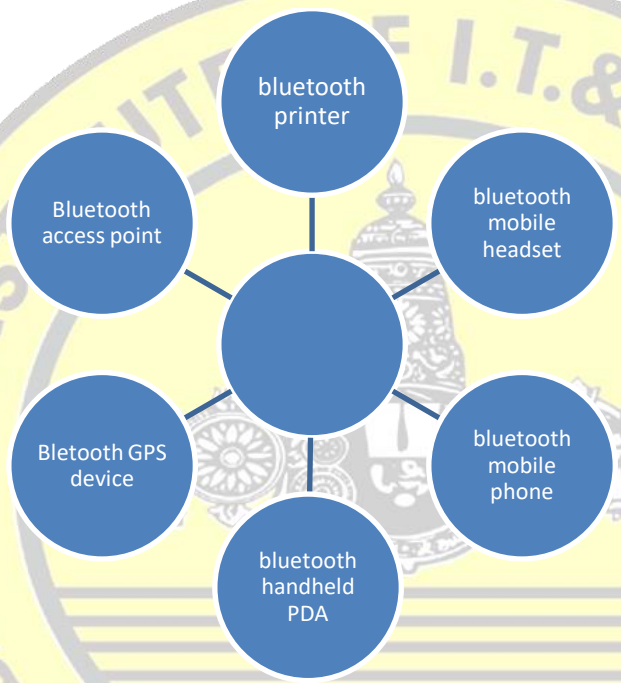


FIG:WIRELESS SYSTEMS

4. BLUETOOTH TECHNOLOGY:

- It is a wireless communication technology that is used for exchanging data over short ranges between fixed as well as mobile devices.
- The average range of Bluetooth devices are between 10 to 100 meters and data transfer rate could be up to 2MBPS

BLUETOOTH PRODUCTS:



GPS:

The Bluetooth-enabled GPS receivers can connect wirelessly to other Bluetooth-enabled mobile devices, such as mobile phones, laptops or PDAs, and send the current position of the user from orbiting navigational satellites.

MOBILE/ACCESS POINT:

Such Bluetooth-enabled access points allow users to connect to internet wirelessly from their laptops or PDAs. They are designed to extend LAN network services to Bluetooth devices, and also provide internet connectivity to multiple devices in a Bluetooth network.

SATELLITE COMMUNICATION:

- It facilitates long distance wireless data transmission between two widely separated points on earth surface.
- These satellites area launched by rocket which places the satellite in its orbit around the earth.

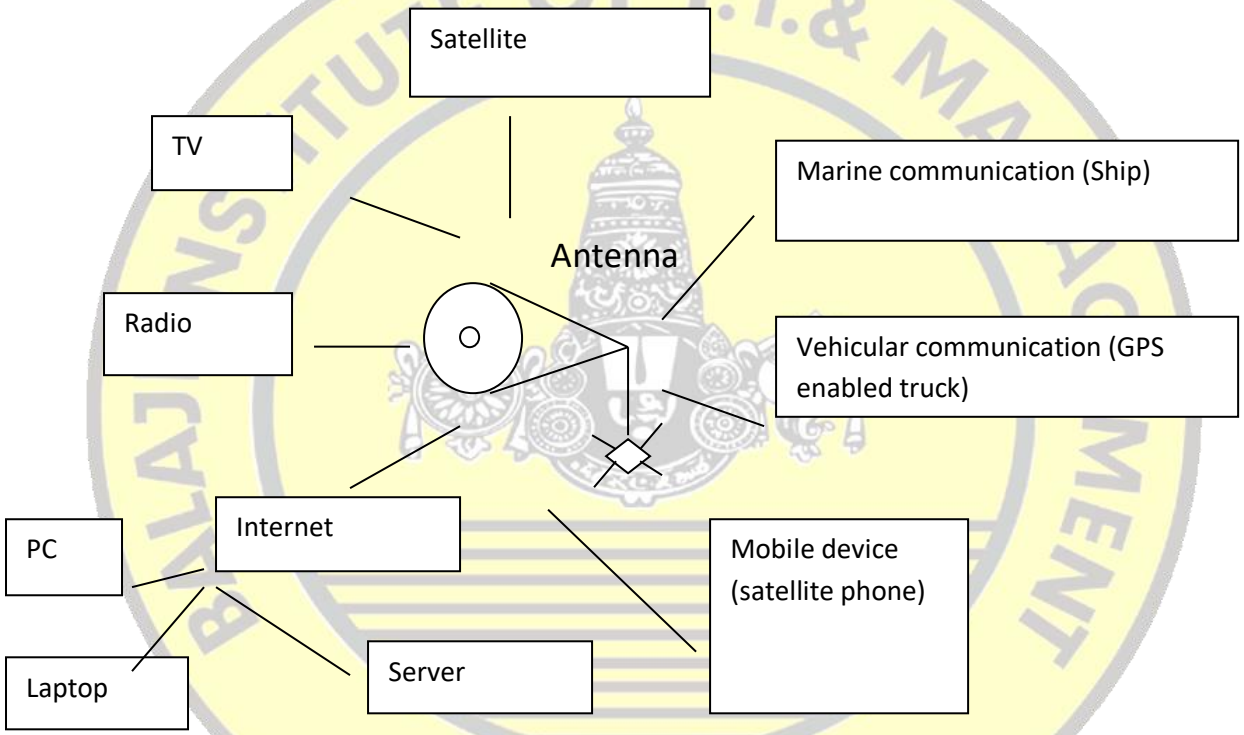


FIG: satellite communication

7.DIGITAL CELLULAR TECHNOLOGY:

CELLULAR COMMUNICATION:

- It is a special type of wireless communication where a geographical area is divided into a number of HEXAGONAL CELLS called cell sites.
- The diameter of each cell site is typically 3 to 4 KM, and may vary depending on the population density of the surrounding region.

- At the centre of each cell is a base station/cell tower, which acts as a transceiver to send/receive signals to/from mobile devices within its range.
- Each cell site is allotted a BAND OF FREQUENCIES for communication within its range, and for each frequency there is a corresponding ANTENNA in the cell tower.
- Each base station is connected to a MTSO (mobile telecommunication switching) usually by LANDLINE.
- The MTSO is connected to PSTN (public switched telephone network) by landline, and establishes connection between a landline phone and a mobile phone.

CELLULAR NETWORKS:

- Cellular networks consist of a number of hexagonal sites distributed over a geographical region.
- The MTSO in turn, is connected to a PSTN also by landline.

FUNCTIONS OF MTSO:

1. Whenever a mobile device enters any cell site, MTSO allocates appropriate frequency channel to the mobile device for communication with base station.
2. MTSO monitors the programs of calls to facilitate billing.
3. MTSO establishes connection between two mobile devices via respective base stations.

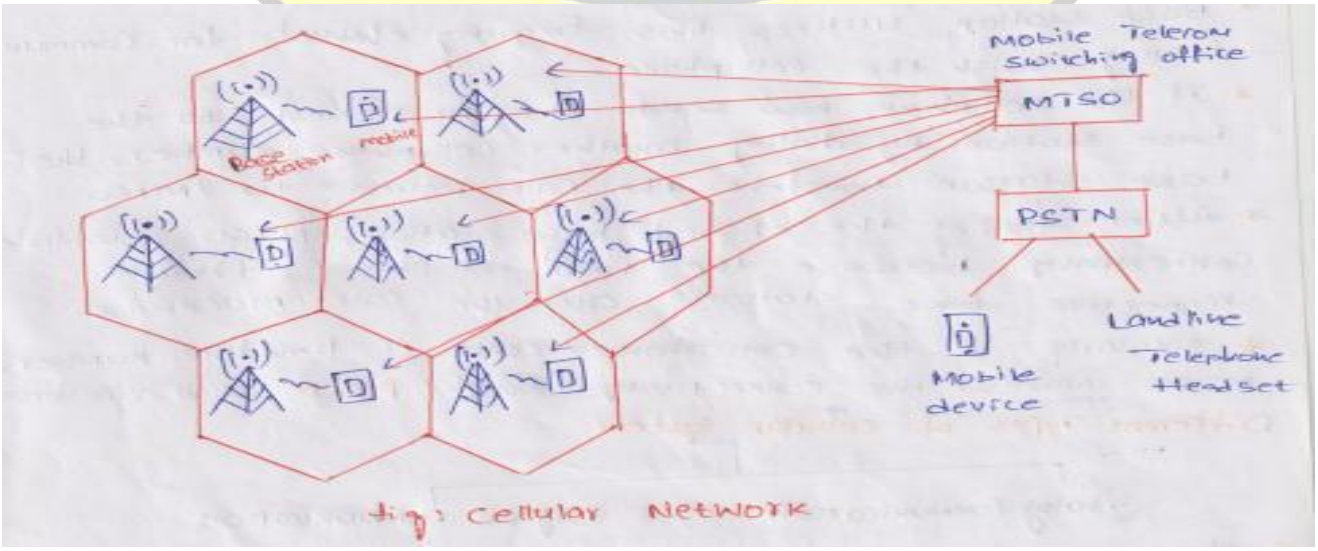


fig: cellular Network

- Whenever a cell phone is powered on, it listens for a system identification code (SIC) from the nearest base station.

- The SIC code is received by a special frequency band used by the base station to send/receive control signals.
- If the cell phone fails to receive the SIC, it display, OUT OF RANGE message or shows NO SIGNAL.
- Then, it sends request to the base station.
- The base station transfers the request to the MTSO, which acknowledges the request and registers the cell phones under the base station.
- Base station utilizes this frequency channel for communicating with the cell phone.
- If the cell phone now sends a call request to the base station by dialing another cell phone number the base station transfers the call request to MTSO.
- After finding the desired base station, MTSO establishes connectivity between the two cell phones through respective base stations and the call proceeds.
- Similarly if the cell phone calls a landline number, MTSO makes the connectivity through PSTN and vice versa.

DIFFERENT TYPES OF CELLULAR SYSTEM

Analog communication **Digital communication**

1. The first generation of cellular networks used analog communication (1960's)
2. All modern day cellular networks are based in digital communication,
   - Better performance
   - Lower cost
   - Voice quality is improved

   Digital systems apply improved modulation and compression technique. Which results in higher capacity of transmission?

- The digital systems are smaller, faster, low power and much cheaper compared to bully analog systems.

TYPES OF CHANNEL SHARING:

1. Frequency division multiple access (FDMA)
2. Time division multiple access (TDMA)

3. Code division multiple access (CDMA)

1. **FDMA:**

- In FDMA the total signal bank width is divided into a number of orthogonal frequency channels.
- The problem with FDMA is that at time only one user is assigned to a given channel and the channel is closed or unavailable to other users until the first user terminates the call

2. **TDMA:**

- In TDMA the spectral capacity is improved by further subdividing each frequency channel into a number of time slots.
- The switching from one user to other occurs rapidly in a time synchronized manner.
- Implementation of TDMA systems are more difficult than FDMA systems as the users must be properly time synchronized.

3. **CDMA:**

- It is based on spread spectrum technique.
- It improves the channel capacity to a large extent by allowing a large number of users to share the same frequency channel for the entire time slot.

STRENGTHS AND WEAKNESS:

- Cellular networks have become an integral part of modern day corporate world.
- They provide extreme strengths mobility and flexibility to innumerable mobile users.
- They offer the ability to integrate voice and data across the same network.
- Internet surfing, email, SMS, MMS, online gaming, Bluetooth and video recording.
- User can access point of sale terminals, make mobile payments, check bank account balance.
- The main strengths of cellular network include low cost, small size of handheld devices, high functionality and wide coverage area across the globe.
- AFRICA has the highest growth rate of cellular subscribers In the world.

WEAKNESS/THREATS:

1. Health concern-radiations (no direct evidence)

2. Cellular fraud (overcome by PIN, voice recognition, biometric identification techniques)

MOBILE PHONE CELLULAR NETWORK:

M - Mobile device

BTS - base transceiver station

BSC – base station controller

MSC – mobile switching centre

VLR – visitor location register

HLR – home location register

ELR – equipment identity register

AUC – Authentication centre

PSTN – Public switched telephone network.

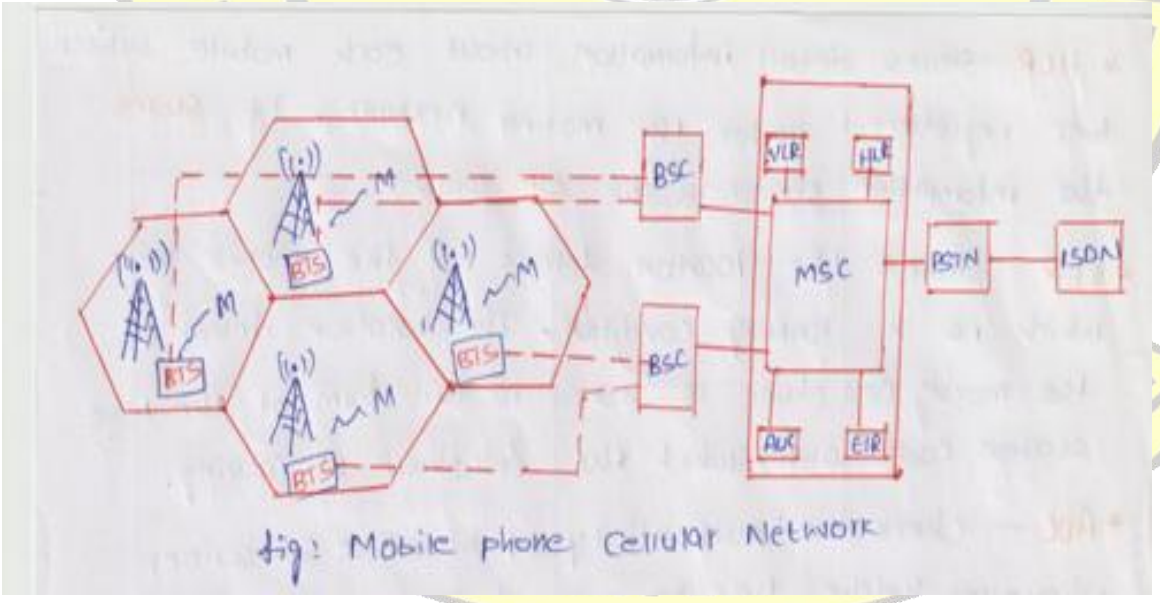


FIG: mobile phone cellular network

- Any mobile phone network such as GSM consists of three subsystems namely; the mobile devices base station subsystems and network subsystem.
- The mobile devices consists of SIM (subscriber identity module) and mobile equipment (keypad and display)

- The base station subsystem consists of individual base stations and corresponding base station controller (BSC)
- The BSC connect each base station to a centralized switching centre called mobile switching centre (MSC)
- The network subsystem consists of the following modules: MSC, HLR, VLR, EIR, and AUC.
- MSC is the foundation of GSM system network.
- Whenever a mobile device generates a call, it first connects to the respective base station.
- The base station, in turn is connected to MSC via BSC.
- The MSC collects the call from base station and forwards it to the outer world for delivery.
- MSC is connected to PSTN for handling voice calls.
- MSC is connected to packet switched network for handling text and internet data.
- HLR stores detail information about each mobile subscriber registered under the mobile network. It stores the information stored in the SIM cards.
- VLR stores the location details of the mobile unit which is in roaming condition. The location detail of the moving cell phone is stored in the form of the base station code under which the cell phone is moving.
- AUC check the authenticity of a mobile subscriber whenever he/she tries to establish a call. The authentication is performed with the calling SIM card and if found ok the user is allowed to make a call through the network.
- EIR enables the system to manage identification of the system against fault and theft. It stores IMET (international mobile equipment identity) for each mobile phone which includes manufacturer details country of production and terminal type.
- This information is used in tracking stolen mobile phones, and whenever a stolen ELR detects it and helps locate and arrest the culprit.
- PSIN to establish connectivity with the landline phones, and is extended to provide packet switched data services from GPRs core network to allow internet access to mobile customers.

FUNCTIONS OF MSC:

1. Call delivery

2. Authentication
3. Call handover
4. Billing

8. MOBILE ACCESS TECHNOLOGY

At the heart of mobile communication systems are the digital cellular networks that employ radio waves for communicating wirelessly with mobile users.

EVOLUTION OF MOBILE COMMUNICATION SYSTEMS:

1. First generation systems (1G systems)
2. Second generation system (2G systems)
3. Third generation system (3G systems)
4. Fourth generation system (4G systems)
5. Fifth generation system (5G systems)

System	Launch time	
1G system	1980	• AMPS Analog FDMA • TACS Analog FDMA • ETACS Analog FDMA
2G system	1990	• GSM Analog TDMA SMS 9.6 KBPS • CDMA IS-95 Digital CDMA • TDMA – IS-136 DAMPS Digital TDMA

2.5G system	1991	• GPRS Packet switched Data service 56 kbps to 115 kbps • EDGE EGPRS IMT-SC PSK 384 KBPS
3G system	2000	• UMTS (WCDMA) IMT-2000 WCDMA HSPA + 2mbps -70 mbps CDMA 2000 3G pp2 14.7 mbps
4G system	2010	• LTE advanced IMT advanced OFDMA 5C-FDMA WIMAX 2 IEEE advanced OFDMA MU-MIMO 1GBPS (downlink) 100 mbps (uplink)

1G SYSTEM

- These were basically analog voice communication systems.
- They offered wireless voice communication using cellular technology and employed analog radio signals to connect to base station towers from mobile handheld devices.

AMPS (ADVANCED MOBILE PHONE SYSTEM):

- It is the first analog cellular network system based on FDMA TECHNOLOGY
- It was launched in USA in 1976
- It was most widely used analog mobile phone system but was suffered from weak security mechanisms that allowed hacking of telephone lines.

TACS (TOTAL ACCESS COMMUNICATION SYSTEM):

It was the European version of AMPSA that used 900M HZ frequency bank and was primarily used in England, hangkong and japan.

ETACS (EXTENDED TOTAL ACCESS COMMUNICATION SYSTEM):

- It was improved version of TACS that used a larger number of communications to support large number of subscribers.
- 1G system were bulky analog systems and soon became obsolete the advert of digital technology and more advanced 2G systems.

2G SYSTEMS:

It employs digital communication technology to digitize voice signals in order to improve transmission quality as well as to achieve higher band width at lower cost.

GSM (GLOBAL SYSTEM FOR MOBILE COMMUNICATION):

- It is the most commonly used mobile communication standard
- GSM is the dominant cellular standard today and accounts for over 80% of all mobile subscribers around the world.
- In India, Bharathi (airtel), Vodafone, BSNL and idea offer GSM services.

GSM FEATURES:

1. SIM cards
2. Phone lacking
3. GSM codes
4. SMS (short messaging service)
5. GSM handover
6. GSM security

CDMA – 1S-95:

- This is a digital mobile network standard based on CDMA technology

- In India, reliance mobile offers CDMA service to about 20 million mobile subscribers.

TDMA – 1S-136:

It is the digital version of analog AMPS technology (D-AMPS)

- It is based on TDMA technology and was first introduced in 1991 in parts of US, ASIA and some other countries.
- Main advantage of GSM SYSTEM, is to it introduced digital data services such as SMS, MMS (multimedia messaging service) etc., the maximum data rate of GSM system is 9.6kbps.

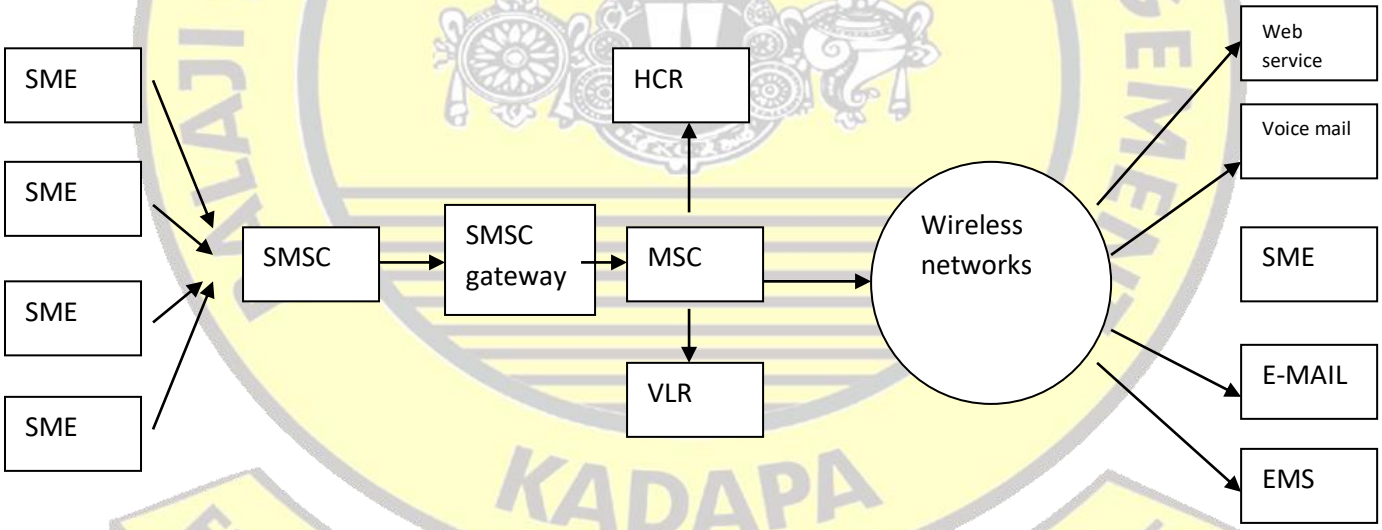


FIG: SMS service architecture

SMSC-short message service centre

SME – short messaging entity

VLR – visitor location register

HLR – home location register

2.5G:

GPRS (GENERAL PACKET RADIO SERVICE): 56kbps to 115 kbps:

- It bridges gap between 2G and 3G system.
- It employed packet switching technology on 2G network so that a number of packets – switched data services can be offered in addition to circuit switched services.
- It can accommodate multiple users simultaneously in the same channel, and are fully internet compatibility and offer internet services such as e-mails, chatting, file transfer, and net browsing.

EDGE: ENHANCED DATA RATES FOR GSM EVOLUTION – (2.75G):

- Data rates up to 384kbps
- Opens door to multimedia applications
- It is referred as EGPRS (extended GPRS)
- The higher data rate is achieved by introduction of advanced 8psk (phase shift keying) encoding that provides substantial increase in the capacity of GSM/GPRS network

3G SYSTEMS:

UMTS (UNIVERSAL MOBILE TELECOMMUNICATION SYSTEM):

- It provides enhanced data rate and supports a full range of high speed multimedia services including brood band internet access.
- UMTS is often referred to as 3GSM system to indicate the 3G evolution from basic GSM foundation.
- UMTS supports a number of packet switched network based data services.
- These includes,

1. **CONVERSATIONAL APPLICATIONS:**
   Voice telephony, video telephony, video gaming.
2. **STREAMING APPLICATIONS:**
   Multimedia services, video on demand, webcast, mobile TV
3. **INTERACTIVE APPLICATIONS:**
   Web browsing, network gaming, database access.
4. **BACK-END APPLIACTIONS:**
   E-mail, SMS, file download.

- If the user wants to make a call and is out of UMTS region, he/she can still make a call using the GSM mode.

CDMA 2000

- CDMA 2000, also known as IMT-CDMA MC (multi carrier) is a 3G mobile technology based on IMT 2000 standard developed by international telecommunication union (ITO)
- The basic purpose of CDMA 2000 was to transform 2G CDMA to 3G CDMA 2000 systems.

ADOPTION AND EVOLUTION:

- Mobile networks are rapidly evolving from 2G to 3G to 4G systems in order to meet growing demands of mobile users.
- The mobile users expect higher data rates for net surfing as well as for various multimedia applications.
- Accordingly 2G network –data rate-10dbps
  2.5G network – 114kbps
  2.75G network – 384 kbps
  3G network – 2mbps
- In European countries where GSM were prevalent the transformation from 2G to 3G happened in two stages

1. GPRS added to basic GSM
2. GSM converted to UMTS (3G)

- At present there are over 450 3G and HSDPA networks all over the world, and the number is fast growing.
- Some operators have launched fixed rate data plans and other low cost plans for 3G information use, leading to the increased usage at reduced cost.

9.4G AND 5G SYSTEMS:

4G SYSTEMS:

- 4G systems are wireless communication systems that follow IMT-ADVANED (international mobile telecommunication advanced) specifications and offer

100mbps data rate for mobile users and 1GPS (1000mbps) data rate of stationary users.

- It employs OFDMA (orthogonal frequency division multiple access) technology that offers higher band width and higher speed and improves the reliability of the system and lower the cost per data bit for the end user.
- It is based on all IP-based pockets switching mode of communication.
- 4G facilities ultra brood bank internet access, IP telephony, streaming multimedia and gaming applications with much higher speed and reliability compared to 3G.
- All these features enable 4G networks to provide antiquations computing that will simultaneously connect to numerous high speed data network across the globe to offer seamless roaming and faultless hand offs throughout large geographical areas.

IMT ADVANCED STANDART (INTERNATIONAL MOBILE TELECOMMUNICATION ADVANCED):

- It provide access to a wide range of advanced packet based mobile services which include fast data access, unified messaging and broad bank multimedia services which are interactive in nature.
- The major difference between IMT 2000 (3G) and IMT advanced (4G) 3G-IMT 2000 – combination of circuit and packet switched networks.
  4G-IMT ADVANCED – entirely packet switched networks.
  The work on IMT-advanced started on 2005

FEATURES OF IMT-ADVANCED:

1. Worldwide roaming capability
2. High quality mobile services
3. Capability of interworking with other radio access systems
4. Bandwidth 5-20M HZ, up to 4.M HZ.
5. Offer high quality multimedia content.

WI-MAX: (WORLD WIDE INTEROPERABILITY OF MICROWAVE ACCESS):

- Provide data rate up to 70 mbps and covers 50km.
- It does not require line of sight connectivity between subscriber terminals and base stations.

- WIMAX tower using a line of sight microware link (often referred to as backhaul)
- WIMAX was first launched in Seoul, South Korea. In USA, sprint Nextel first introduced WIMAX in 2008 and branded it as 4G.

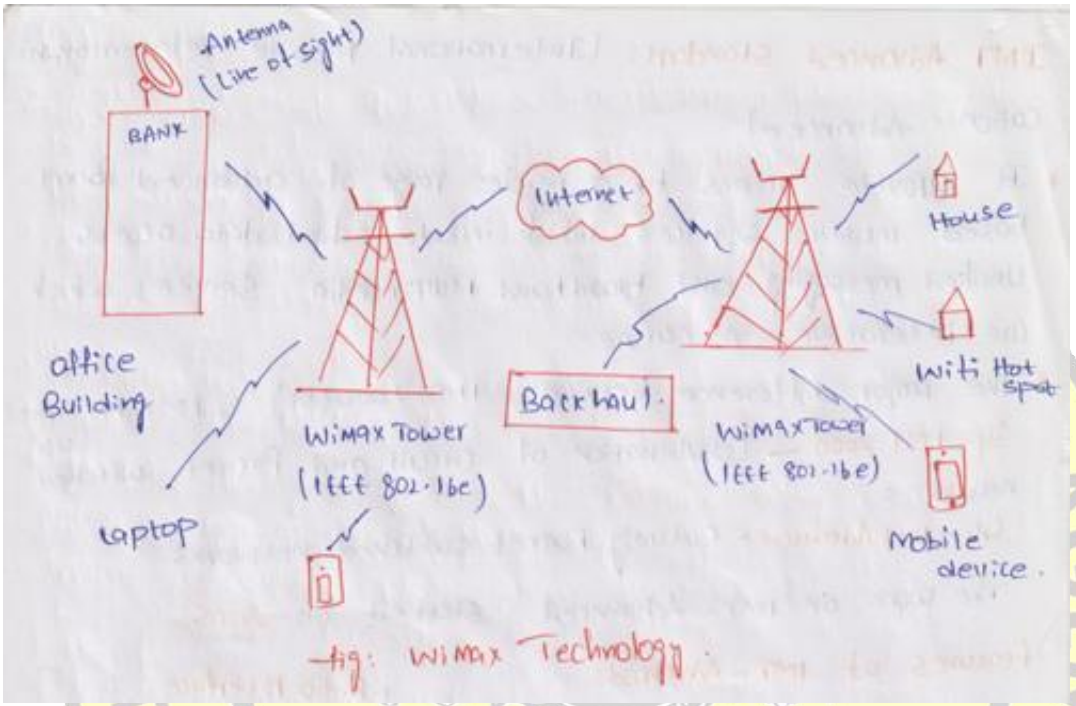


fig: WiMax Technology

4G OBJECTIVES AND GOALS:

1. To achieve high data rates of 1gbps for stationary objects and 100mbps for moving objects.
2. To achieve high spectral efficiency and high network capacity, much higher than 3G systems.
3. All IP-based packet switched network.
4. Higher operating frequency (3-10 G HZ) compared to 3G (1.8 to 2.8 G HZ)
5. To deliver high quality rich multimedia applications including real time audio/video, high definition television (HDTV) mobile gaming etc, under completely mobile environment.

5G SYSTEMS:

- 5G systems are the next evolutionary mobile network systems that will come after 4G systems.
- It is expected to be launched ground 2020.
- It is expected that 5G will bring a revolutionary change in the mobile devices.

- 5G will also utilize the benefits of artificial intelligence.
- In 5G during video call, the picture along with the smell of the place of the caller can be perceived.
- It is expected that 5G will resolve many of the problems existing in present mobile communication systems and at the same time will become user friendly and cost effective.

	5G TECHNOLOGIES
→	Cognitive radio
→	Pervasive computing
→	High attitude stratospheric platform systems (HAPS)
→	Dynamic ad-hoc wireless networks (DAWN)
→	Group co-operative relay systems wireless World Wide Web (WWW)

1. **COGNITIVE RADIO:**

- Cognitive radio is a wireless communication technology that is capable of detecting free communication channels in the surrounding region, and can instantly switch to the vacant/idle channels, thus avoiding interference with other users.
- In order to improve communication efficiency as well as reduce interference with other users, cognitive radio systems continuously monitor various transmission and reception parameters of the surrounding medium and can reconfigure their communication functions according to better serve the user.
- The cognitive radio was first conceptualized by JOSEPH MITOLA, in 1998 and hence it is also known as MITOLA RADIO.

2. **PERVASIVE COMPUTING (UBIQUITOUS COMPUTING):**

- It is a technology that embeds tiny microprocessor chips to everyday objects ranging from electrical appliances, cars, furniture, human body, home etc.
- They can communicate and share information among themselves with the help of wireless networks and ICT (information and communication technology)

- Ubiquitous means that the connectivity of these devices area unobtrusive and they are present everywhere.
- The goal of pervasive computing is t achieve is to achieve full convergence of wireless networking, advanced digital electronics and internet technology.

HAPS (HIGH ATTITUDE PLATFORM SYSTEM):

- These are special purpose aircrafts that are positioned at stratospheric altitude of 15 to 20km above sea level and provide infrastructural support for wireless communication system and other terrestrial communication system.
- A number of HAPS in the sky can be interconnected with each other through optical communication links thus forming a network.
- Due to high altitude the attenuation by rain becomes negligible and it is easy to get clear line of sight to and from HAPS.
- It has estimated that HAPS loss less than satellite system.
- HAPS are capable of serving large number of users either in dense urban areas.
- Usually a 600M HZ band is allocated for HAPS applications in the frequency range of 47- 49G HZ.

DAWN – DYNAMIC AD-HOC WIRELESS NETWORK:

- DAWN is a special purpose wireless network formed by a number of mobile devices that communicate among themselves in a decentralized manner without the aid of any established infrastructure or centralized server.
- For example – a group of employees of an organization may wish to share files in an airport, a group of emergency resource workers may rapidly need to deploy a wireless network after earthquake or flood. In all these cases a collection of mobile hosts will dynamically form a temporary network in a completely decentralized manner, thus creating ad-hoc network.

GROUP COOPERATIVE RELAY SYSTEMS:

- Cooperative relaying is a communication technique where a number of adjacent nodes in a wireless network assist to reduce the negative effects of multi-path fading or other disturbances.
- So on the event of a packet drop where a particular data packet cannot be delivered to the destination node, a copy of the packet can be retransmitted by a neighboring node that has successfully overheard the direct transmission.

WIRELESS WORLD WIDE WEB (WWWW):

- Mobile commerce is the process of performing business transactions through mobile handheld devices.
- It requires wireless internet connectivity in the form of WWWW.
- E-COMMERCE to M-COMMERCE
  The proposed WWWW will allow consumers to remain connected to information and data throughout the day and anywhere they travel.

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(17E00307) MOBILE COMMERCE

Objective: The objective of the course is to describe M-commerce system concepts ,to critically analyze examples and cases of M-commerce systems and to examine some of the applications in M-commerce

1. Current Status and Future Trends in Mobile Commerce, Technology Issues in Mobile Commerce, Mobile Commerce Systems, Mobile Ecommerce on Mobile Phones, Technologically advanced handheld devices, like Smart phones, PDAs, Laptops, Tablets and Portable gaming consoles etc.
2. Transactional Database Accesses for M-Commerce Clients, Techniques to facilitate Information Exchange in Mobile Commerce, Information System and Application Issues in Mobile Commerce, The emergence of Location based Mobile Commerce, The need for Mobile based Approaches
3. Managing the Interactions Between Handheld Devices Mobile Applications and Users, Mobile Commerce and Usability, a Landscape Analysis,
4. Mobile marketing, mobile ticketing, mobile computing, mobile payments and mobile banking vis-a-vis latest technologies (wireless and mobile communication technology, digital cellular technology, mobile access technology and 4G and 5G systems
5. Configuring M-Commerce Portals for Business Success, Knowledge Management in a Mobile Computing Context, Multimedia Messaging Peer Mobile Financial Services, Mobile Banking – A Strategic Assessment, Service for Mobile Commerce Applications, Quality of Perception in M Commerce

Text Book:

- Advances in Mobile Commerce Technologies, EE-Peng Lim, KengSiau, Idea Group of Publishing

Reference Books:

- Mobile Commerce Applications, Shi, Nansi, Idea Group of Publishing
- Mobile Commerce, KarabiBandyopadhyay, PHI

UNIT-5

1. CONFIGURING M-COMMERCE PORTALS FOR BUSINESS SUCCESS:

PORTALS: It is an internet gateway that enables mobile devices to connect remotely with an enterprise internet via web browser interface.

- M-commerce requires transactions conducted via mobile telecommunications networks using **communication , information and payment devices** such as mobile phones or palmtop units.
- Geographic positioning and location capabilities are also being added to such networks and devices.
- Rather than using general purpose browsers, customers accessing m-commerce applications often rely on specific mobile portals or m-portals.
- These m-portals could be specific,
  - To the device that the user has,
  - To the communications infrastructure provider
  - To the financial infrastructure provider
  - To other service aggregators who act as gateways to a variety of mobile services.
- As the experience of **the imode platform of NTT DoCoMo** (Do Communications over the Mobile network)(dokoma, meaning **"everywhere**" in Japanese) has already shown, the ability to connect end customers and service providers through an m-portal is a key element for the success of m-commerce.
- M-portals attract and retain customers.
- Success in mobile portal markets will depends on dynamic strategies that blend elements of,
  - Personalization
  - Permission
  - Content specification

  As they apply to e-commerce and m-commerce.

In this topic we present a framework for developing effective business strategies for developing and managing mobile portals.

CONFIGURING M-COMMERCE PORTALS FOR BUSINESS SUCCESS:

- For m-commerce to happen the device and network should be configured to enable **CLIP.**
  - Communication
  - Locatability
  - Information Exchange and
  - Payments
- CLIP functionalities are very useful for designing mobile portals (m-portals) and provide mobile services.
- The winners or successors of business, utilize m-portals that can utilize the key success factors for m-commerce.
- **COMMUNICATION (C):** The communication applications include the basic offerings of ISP (Internet Service Providers), Fixed-line Service Providers (FSPs), wireless service providers (WSPs).
- **INFORMATION (I)**: SMS, MMS, WAP, and WEB.

Text based data can assessed.

Many m-portals team up with content providers to deliver news and entertainment and some also give access to the employing company's information system and private information stored in a personal information manager such as MS outlook.

- **PAYMENTS (P**): It requires efficient and secure exchange of financial data, the methods of integration are still evolving.

Example – M-banking, e-wallet, billing.

- **LOCATABILITY (L):** these are based upon **geo-coded data**. Map makers making it possible to download maps, GPS servers. Now-a-day's users are getting nearest locations.

M-PORTAL: USERS WINDOW TO M-COMMERCE:

- Users interact with mobile communication and m-commerce systems through the small-screen-based interface on their hand held devices.

NOTE: Write about m-commerce(BASICS).

- To the users this small screen opens up an electronic window to the world.
- Besides text, tones and icons the mobile device can also potentially offer music, photos, videos, animations and other types of content.
- Of course both the network and the device have to be advanced for such multimedia content to flow to the user.
- **To the users, the handheld device -and especially the small screen- represent the mobile portal or m-portal the gateway to mobile services.**
- For service providers and device makers, the challenge is to make the m-portal versatile and capable in **CLIP** terms ,so as to seamlessly and easily deliver a range of service to the users.

Personalization ,permission and specification in m-commerce and e-commerce.

DIMENSION	E-COMMERCE	M-COMMERCE
PERSONALIZATION		
User centric database	Slow evolution	Fast evolution
tailoring of services and context	Somewhat limited	Possibly extreme
Learning and intelligence	Limited	Extensive
PERMISSION		
Scope of permission	Relatively narrow	Relatively broad
Depth of permission	Relatively shallow	Relatively deep

SPECIFICATION		
Role demarcation	Sharp	blurred
Nature of role specification	Static	dynamic
Service or content specifications	Somewhat configurable	Evolving and dynamic

CONTENTS OF AN EFFECTIVE BUSINESS STRATEGY FOR M-PORTALS:

	COMMUNICATION	LOCATION	INFORMATION	PAYMENT
Permission	Types of communication &senders can be permitted or forbidden.	Types of information and senders can be permitted/ forbidden.	Payments features can be enabled or disabled individually or collectively.	Locatability &geo-positioning features can be enabled or disabled.
Specification	Off/on duty button preferences current time of the day &location of the user specify which message go through.	Off/on duty button preferences current time of the day and location of the user specify types of information	Off/on duty button preferences current time of the day and location of the user specify types oftransactions	Geographical position feeds CLIP specification features.

Personalization	Dynamic unified inbox	**Me and my** personalized information portal for news, travel information, company information and entertainment.	Personal e-wallet, stock portfolio and phone bills.	Dedicated maps.

- The word **portal means gate**, through which something will pass, in an effort to get to another place.
- Portal is a necessary/convenient place one must go to get to the desired location.
- Mobile portals/sometimes called **"portable portals"** are developed to assist wireless users in their interactions with web-based materials.
- Mobile portals are often modeled by aggregating applications(e-mails, calender, instant messaging etc.) and content from various providers in order to become the user's prime supplier of web-based information.

Example – yahoo (Mobile yahoo.com) and MSN (mobile.msn.com)

MERITS OF M-PORTALS:

- Ubiquity
- Convenience
- Localization
- Personalization

CONCLUSION: M-portal development is likely to parallel the growth in overall m-commerce. Other functionalities like file attachments, faster network speeds

Bluetooth, speech recognition, etc. more users will be attracted to this mobile marketplace.

Thus, the configuring of mobile-commerce portals plays a very crucial role for business success.

2.KNOWLEDGE MANAGEMENT IN A MOBILE COMPUTING CONTEXT:

- **Knowledge discovery in mobile business data.**
- **M-business environment.**
- **Process of knowledge discovery**
- **Data mining challenges and their solutions.**

1. KNOWLEDGE DISCOVERY IN MOBILE BUSINESS DATA:

- The increasing number of mobile device users is creating a huge amount of useful data for the providers.
- These data are valuable and can help a business with further developments and strategies if turned into knowledge with the use of **data mining.**
- The mindful use of data mining allows organizations,to
  - ✓ Increase customer satisfaction
  - ✓ To determine new customer groups for marketing purposes
  - ✓ To detect fraudulent activities and
  - ✓ To find future usage of mobile technology.

Using m-business applications ,enterprises are able to operate their business more effectively have a greater level of customer satisfaction and generate additional revenue data mining or knowledge discovery in databases is the extraction of interesting ,meaningful, valid and actionable information from a pool of data sources.

- The valuable and real time information inferred from the data can be used for **decision making.**

  For Example – the rapidly increasing sale of mobile phones and PDA has resulted in an increased number of service provides.

- The DM (Data Mining) technology can help providers to develop services and sales strategies for future benefits.

2. **MOBILE – BUSINESS ENVIRONMENT**:

- **M-BUSINESS**: can be defined as the use of mobile technology in the exchange of goods, services information and knowledge.
- **M-COMMERCE**: is the execusion of transactions done on mobile equipment via mobile networks which may be wireless.
- M-commerce represents a subset of all e-business transactions both in B2C & B2B areas.
- **For Example** – In Finland, people can buy a soda from a vending machine via a mobile phone by dialling a special code on the mobile phone, with cost being automatically deducted from the customer's bank account.
- **GERMANY** – located parking spaces by mobile phones.
- The basic value chain model of m-business of 2 main areas,
  - ✓ Content and
  - ✓ Infrastructure and services.
- The area of content consists of
  - ✓ Content creation
  - ✓ Content packaging (formatting, editing, customizing, combing)
  - ✓ Market making (content and service selection)
- The area of infrastructure and services includes,
  - ✓ Mobile transport
  - ✓ Mobile services
  - ✓ Delivery support
  - ✓ Mobile interface and applications.

3. PROCESS OF KNOWLEDGE DISCOVERY:

The continuous explosion of data has prompted the development of the process of Data Mining (DM) or Knowledge Discovery In Databases (KDD) which derives concrete and concise information from data.

DEFINITION OF DATA MINING (DM): DM is defined as an interactive, iterative, nontrivial process of deriving valid, interesting, accurate, potentially useful and ultimate comprehensible structures from Data.

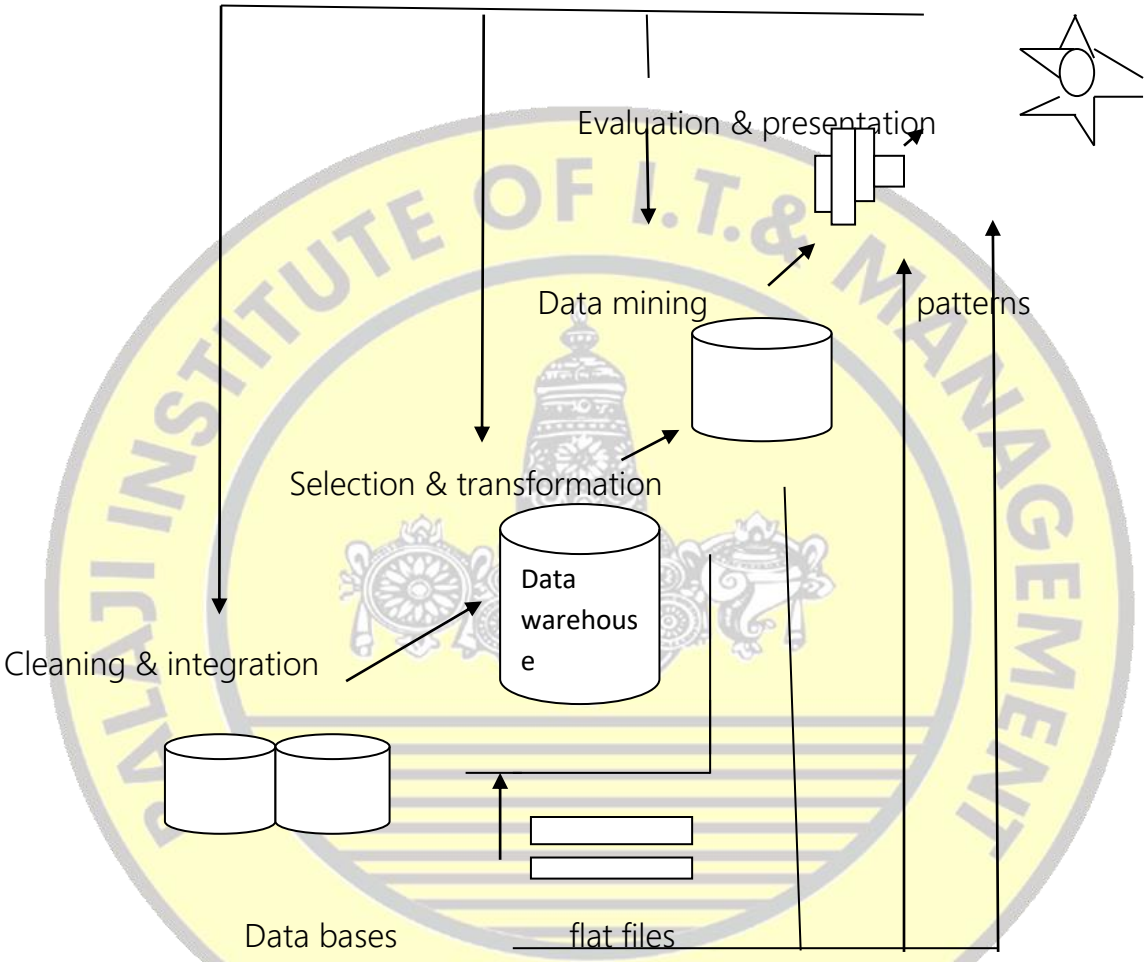


Fig: data mining process

4. DATA MINING CHALLENGES AND THEIR SOLUTIONS:

- In order to apply data mining efficiently in m-business certain requirements have to be met.
- Ideally the methods used for mining mobile data should be able to,

✓ Mine different kinds of knowledge in databases.

✓ Deal with diverse types of data types such as relational, temporal and spatial types of data.

- ✓ Mine information from heterogeneous databases and global Information Systems
- ✓ Handle noisy and incomplete data, which is mostly the case in the m-business domain.
- ✓ Perform the mining tasks efficiently regardless of the size and complexity of the dataset.
- ✓ Support interactive mining of knowledge at multiple levels of abstraction.
  - The data mining software can be developed as a collection of components that may be based on object technology.

CHALLENGES:

- Distributed environment
- Click stream data. (small screen)
- Security and privacy
- Cost justification
- Technological limitation

DATA MINING PROCESS AND INTELLIGENT AGENTS (SOLUTIONS) :

- ✓ **INTELLIGENT AGENT:**

- It supports for online transaction data mining.
- The several steps of the knowledge discovery process can be partly automated using intelligent agents.
- Intelligent agents use domain knowledge with embedded simple rules.
- ✓ The use of **training data** helps to reduce the need for domain experts.
- ✓ Data cleansing can be automated using intelligent agents with a rule base.
- ✓ Agents can be used in implementing, classification ,clustering summarization and generalization models that here a learning nature and rules generation.
- The agents are implemented based on machine learning techniques and data mining techniques.
- The automated decision support is called **Active Data Mining.**

- In conclusion intelligent agents are very important in the process of knowledge discovery especially in distributed environments such as m-business by supporting the discovery process in many stages.

3.MULTIMEDIA MESSAGING PEER MOBILE FINANCIAL SERVICES:

INTRODUCTION:

- Multimedia messaging peer discusses the development of a multimedia messaging client for PDA (personal digital assessments)
- Here we also discusses the various messaging technologies, enabling wireless technologies and peer-to-peer model, which were studied during the development and the application.
- The peer-to-peer technology used was JXTA, an XML-based and language agnostic peer-to-peer platform specification from sun Microsystems.
- The peers (PDA client and the kiosk) were implemented using the application programming interfaces provided by personal java reference implementation and the JXTA platform personal java port.

ENTERPRISE MESSAGING FOR FINANCIAL SERVICES:

Communication and collaboration are more important to financial institutions than ever before.

MMS (MULTIMEDIA MESSAGING SERVICE):

- MMS operates in the same way as SMS (regular texting)
- MMS allows images sound and video to be sent from mobiles.
- MMS works in the same way as sending a text.
- MMS allows different formats to be sent. These include formatted text

IMAGES:

- While sending images ,you can send JPEG and GIF image files.

- Sound: you can send mp3 and MIDI sound files and you can send MPEG video files.
- MMS also used to download files from a WAP website.
- You can send video from your phone and upload it to the web.
- MMS is sent as one complete file not multiple attachments.
- MMS - NO limit.

  Unlike SMS messages NOT LIMIT MMS files have no limit.

  160 characters.
- In MMS for fast transaction use at least a 3G phone network.
- You can use the **GPRS** network but delivery is much slower.

- MMS can be used to send content to customers

MMS:

MMS is a standard way to send messages include multimedia content to and from mobile phone over a cellular network.

Unlike text-only SMS, MMS can deliver a variety of media, include up to forty seconds of video ,one image a slideshow of multiple images or audio.

HISTORY:

- MMS was first developed in 1984.
- Early MMS deployments were plagued by technical issues and frequent consumer disappointments.
- China was one of the early markets to make MMS a major commercial success, parley s the penetration rate of personal computers was modest but MMS-capable camera phones spread rapidly.

- Europe's most advanced MMS market has been Norway and in 2008 the Norwegian MMS usage level passed 84% of all mobile phone subscribers.
- Between 2010 and 2013, MMS traffic in the U.S increased by 70% from 57 billion to 96 billion messages sent. This is due in part to the wide adopting of smart phones

CHALLENGES:

There are some interesting challenges with MMS that do not exist with SMS.

1. Content adoption
2. Distribution lists
3. Bulk messaging
4. Handset configuration
5. WAP push

EXPLANATION:

1.CONTENT ADOPTION: Multimedia content created by one brand of MMS phone may not be entirely compatible with the capabilitible with the capabilities of the receipients MMS phone

2.DISTRIBUTION LISTS: Current MMS specifications do not include distribution lists nor methods by which large numbers of recipients can be conveniently addressed,particularly by content providers called value -added service providers in 3GPP.

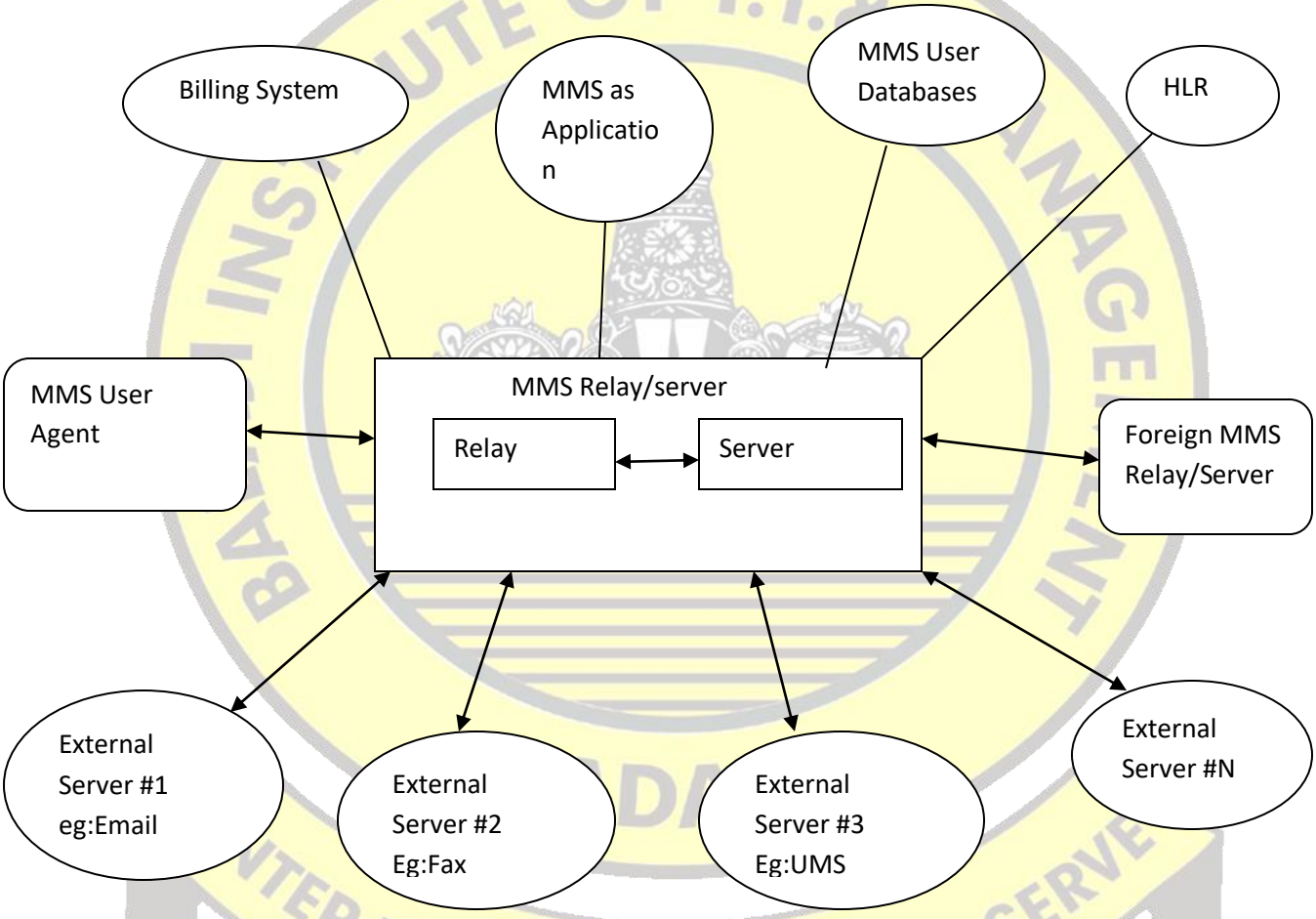
3.BULK MESSAGING: The flow of peer- to- peer mms messaging involves several over the air transactions that become inefficient when mms is used to send messages to large numbers of subscribers, as is typically the case for VASPs.

4. HANDSET CONFIGURATION: Unlike SMS,MMS requires a number of handset parameters to be set.Poor handset configuration is often blamed as the first point of failure for many users.

5.WAP PUSH: Few mobile network operators offer direct connectivity to their MMCSs for content providers.

WAP push enables "Rich content"to be delivered to a handset by specifying the URL of a Pre-Compiled MMS,hosted on a content providers Web server.

INTERFACES:



MM1 - The 3GPD interface between MMS user agent and MMS centre (MMSC, the combination of the MMS relay and server)

MM2 - The 3GPD interface between MMS relay and MMS server.

MM3 – the 3GPD interface between MMSC and external servers.

MM4 – the 3GPD interface between different MMSCs

MM5 – the 3GPD interface between MMSC and HLR

MM6 – the 3GPD interface between MMSC and user databases.

MM7 – the 3GPD interface between MMS V/S applications and MMSC

MM8 – the 3GPD interface between MMSC and the billing systems

MM9 – the 3GPD interface between MMSC and an online charging system

MM10 – the 3GPD interface between MMSC and a message service control function.

MM11 – the 3GPD interface between MMSC and an external transaction.

CONCLUSION: MMS history, challenges, interfaces briefly explained.

Thus, the multimedia messaging peer mobile financial services was briefly explaining with comparison of SMS services.

4.MOBILE BANKING- A STRATEGIC ASSESSMENT

Note: Write unit 4 mobile banking

Introduction: As smart phone penetrating continues to increase, so do consumer expectations. To keep up, banks need to continuously review the best mobile banking strategies worldwide, developing these solutions that address customer needs and leverage the benefits of the channel.

Mobile banking has moved quickly beyond being simply online banking using a smart phone. It is at the hub of the customer relationship and is quickly becoming a point of differentiation and a potential source of revenue for progressive banks.

MOBILE BANKING A STRATEGIC ASSESSMENT: Mobile banking strategy ,extensive research is being complied around market place assessment, mobile strategy development, optimal organizational structures ,Technology selection, Best

practices ,Measurement benchmarks and ways to continuously improve the mobile banking experience.

DISCOVER	PLAN	ACT
Vision	Assessment	Organization
Landscape	Strategic plan	Processes
Business case	Road map	Tools and technology

ORGANISATIONS (BANKS) WERE JUDGED ON THE FOLLOWING:

One of the key finding was that, while there are definitely examples of successful mobile banking implementations, far too many banks are not doing much more than meeting the basic needs of the consumer ,rolling out apps and features without a clear assessment of where customer expectations and business objectives align.

1. **Supporting mobile touch points**
2. **Encouraging mobile banking enrollment and use**
3. **Enhanced account insight and money management**
4. **Expanded transactional functionality**
5. **Mobile service accessibility**
6. **Cross channel integration**
7. **Marketing and cross selling through**
8. **Promoting mobile banking.**

1. **SUPPORTING MOBILE TOUCH POINTS:**

- With the range of mobile platforms increasing it is important for banks to be able to provide support across all touch points (optimizing for size, and shape of unit) and across alternative delivery methods including two way SMS banking dedicated mobile website downloadable phone apps and tablet apps.
- Finally it is important to have a banks entire front line and customer service team familiar with the mobile banking platform and trained to answer

questions from a perspective of having used the service themselves. Some banks have been provided incentives to employees for conducting customer training sessions.

2. **ENCOURAGING MOBILE BANKING ENTROLLMENT AND USE:**

- It is also found banks that let customers enroll for mobile banking using their mobile phones.
- It suggests that "Digital banking teams should build process processes that let customers enroll through as many channels as possible including ATMS, branches call centers, mobile and online."

3. **ENHANCED ACCOUNT INSIGHT AND MONEY MANAGEMENT:**
   Most banks get the basics right from providing balances to allowing access to previous transaction history. The differences come in providing more than the basics from a customer experience perspective.
4. **EXPANDED TRANSACTIONAL FUNCTIONALITY:**

- Being able to perform transaction easily, using a smart phone is the key to customer mobile engagement.
- The more a customer can do using their phone, and the more contextual interaction that can occu,r the less likely the customer on the go will leave your bank.

5. **MOBILE SERVICE ACCESSIBILITY:**
   As mobile banking becomes the primary way to conduct business for many customers ,they will expect to be able to access a growing number of service related tasks from within their mobile banking application.
6. **CROSS CHANNEL INTEGRATION:**
   While being able to access customer support directly from the mobile app a great example of cross- channel support ,there are other ways for all of a customer's interactions with a bank to be integrated.
7. **MARKETING AND CROSS SELLING THROUGH MOBILE:**

- Banks fully utilize the potential of the mobile banking channel for the marketing of additional services the way they have leveraged the online banking channel.

- While there are spacial and time limitations on what marketing can be done on a smart phone or tablet compared to a computer screen potential still remains that is untapped.

8. **PROMOTING MOBILE BANKING:**
   Banks must being to promote mobile banking to a wider audience using messaging that appeals to those customers who don't understand the benefits of the channel.

CONCLUSION: Before rolling out more standalone mobile apps, digital banking leaders need to lay out a vision for how mobile will change the way their bank sells and services its customers with this in mind, digital banking in the future must be simple, ubiquitous personal, empowering and most importantly reassuring.

5.SERVICE FOR MOBILE COMMERCE APPLICATIONS:

M-COMMERCE services and applications can be adopted through different wireless and mobile networks with the aid of several mobile devices.

- However,constrains of both mobile networks and devices influence their operational performance;therefore ,there is a strong need for taking into considerations those constraints in the design and development phases of M-Commerce services and applications.

NOTE: WRITE DEFINITION OF M-COMMERCE (BASICS)

- M-COMMERCE has playing a major role ,in the present world. people on the more need services information and entertainment that move with them.
- Mobile services benefits from three major factors.
  1. Personalization
  2. Time- sensitivity
  3. Location awareness

- An important factor in designing m-commerce services and applications is **the need for identification of the mobile user's requirements and the classification of the services with their unique properties.**

PROBLEMS:

1. The more features built into a device the more power it needs (high power consumption)
2. Wireless data transmission consumes a lot of energy.
3. Smaller key boards, small screen.
4. Limits capabilities for high quality graphical display.

The above problems overcome with the

voice recognition

Touch sensitive displays.

NOTE: write unit-4 mobile access technology and 4G, 5G systems briefly (system supporting mobility)

- Although there are many systems supporting mobility and many solutions for wireless access ,there is still a lot to be done in the field.
- The major issues influencing the performance of the various mobile systems are the following.

1. **Interface**: High loss rates due to the fact that radio transmission cannot be protected against interference.
2. **LOW BANDWIDTH**: Although they are continuously increasing, transmission rates are still very low for wireless devices compared to fixed wired network.
3. **HIGH DELAYS LARGE DELAY VARIATION**: High delays of hundred milliseconds to seconds can occur.
4. **LOW SECURITY SIMPLER TO ATTACK**: The radio interface is prone to the danger of being attacked.
   Thus, wireless access always has to include encryption ,**authentication and other security mechanisms.**

5. **FREQUENT DISCONNECTIONS**: cell interference, limited cell capacity or lack of network coverage can lead to frequent disconnection.

MOBILE USER REQUIREMENTS:

1. Ubiquity (stock prices, weather)
2. Personalization (advertising, auctions)
3. Flexibility (purchase of goods, banking)
4. Localization (customer services)

M-COMMERCE CONTRAINTS:

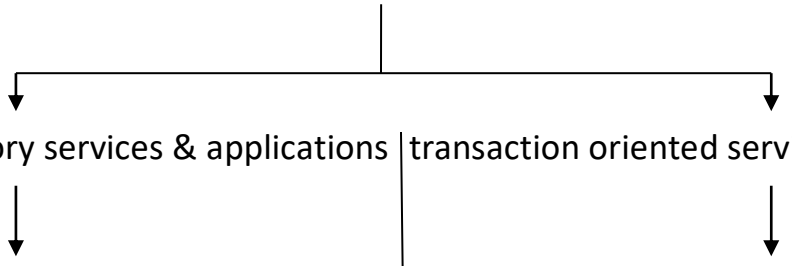
Performance
Reliability
Security
Ease of use and
band width

These requirement can be Summarize as follows:

1. Easy and timely access to information (example: the latest availability of flights)
2. Immediate purchase opportunity (example: the immediate purchase of tickets)
3. Provision of wireless coupons based on user profiles (example: the delivery of messages about a current sale in a local store.)
4. Bank transitions through mobile terminals (example: the withdrawal of money from an account that can be used later for an electronic payment)
5. Local management (example: locating a person/ATM/restaurant that is nearby).

M-COMMERCE SERVICES AND APPLICATIONS CLASSIFICATION:

One way to classify m-commerce services and applications is based on the **functionality they provide to the mobile users**. This kind of classification results in two major classes.



The directory services & applications	transaction oriented services & application
• (Perform only read requests to the transaction server)	mobile users conducts transactions with the service provider.
• Provide information to mobile Users.	read and write operations.
• **For example**: a mobile user, being Away from home, needs up to date Information regarding his current Location and local facilities that he Can use.	**for example**: Banking service for mobile users
• Offered via broad cost.	
• The current mobile and wireless technologies suffer from constraints due to wireless and mobile environment.	
• These constraints influence the transactions oriented m-commerce services in a much higher degree in terms of operation ,than the directory oriented m-commerce services.	
• **Problems like frequent and sudden disconnection, weak connectivity and high delays degrade the quality of service offered to mobile users and add complexity to the service provider.**	
• The above mentioned classified of services can help the service providers to deal with specific problems of each class independently.	

CONSTRAINTS AND REQUIREMENTS FOR DIRECTORY AND TRANSACTION ORIENTED M-COMMERCE SERVICES:

DIRECTORY ORIENTED	TRANSACTION ORIENTED
High availability	Bounded transaction execution time
Quick access time	Data consistency
Quick response time	Data integrity
Localization	Security

Personalization	Redundancy
Filtering (rules filtering)	
Security	

CONCLUSION:

- M-COMMERCE is an evolving area of e-commerce where users can interact with the service providers through a mobile and wireless network, using mobile devices for information retrieval and transaction processing.
- An important factor in designing m-commerce services and applications is the need for proper identification of mobile user's requirements as well as mobile devices and technologies constraints.
- This kind of classification results in two major classes.
  1. The directory
  2. The transaction- oriented services and application with their unique properties.
- Future work will include the verification of the methodology described through the actual development of m-commerce services and applications for each of the two classes reported.

6. QUALITY OF PERCEPTION IN M-COMMERCE

In an m-commerce setting, the underlying communication system will have to provide a Quality Of Service (QOs) in the presence of two competing factors,

1. Network bandwidth
2. The pressure to add value to the B2C shopping experience by integrating multimedia applications grows increasing data sizes.

- B2C (Business To Consumer) applications represent particularly high growth area of e-commerce.
- In this topic, developments in the area of QOS- dependent multimedia perceptual quality are reviewed and are integrated with recent work focusing on QOS for e-commerce.

- Based on the previously identified user perceptual tolerance to varying multimedia QOS, we show that enhancing the m-commerce B2C user experience with multimedia, for from being an idealized scenario is in fact feasible if perceptual considerations are employed.
- B2C applications represent a particularly high growth area of e-commerce.
- With general user concerns in B2C environments relate to issues such as **TRUST,PRIVACY,CONVINIENCE** in mobile communication context ,considerations of user satisfaction are further hampered by matters relatively constrained,

1. Input capabilities
2. Limited size
3. Processing capability and
4. Battery powers of the device themselves.

   A central issue to the acceptance of B2C applications is one of the qualities and this shall be the main theme of this topic.

FIGURE Details m-commerce B2C applications can be approached from three main ,**sometimes overlapping, perspectives and with each; one can as society a notion of quality.**

Main factors in m-commerce environment.

1. Perception
2. Service

1. **PERCEPTION:**
   It characterizes the technical side of computer networking and represents the performance properties that the underlying network is able to provide.
2. **SERVICE:**
   It is novel term coined by us and gives a more complete characterization of the human side of the m-commerce experience.

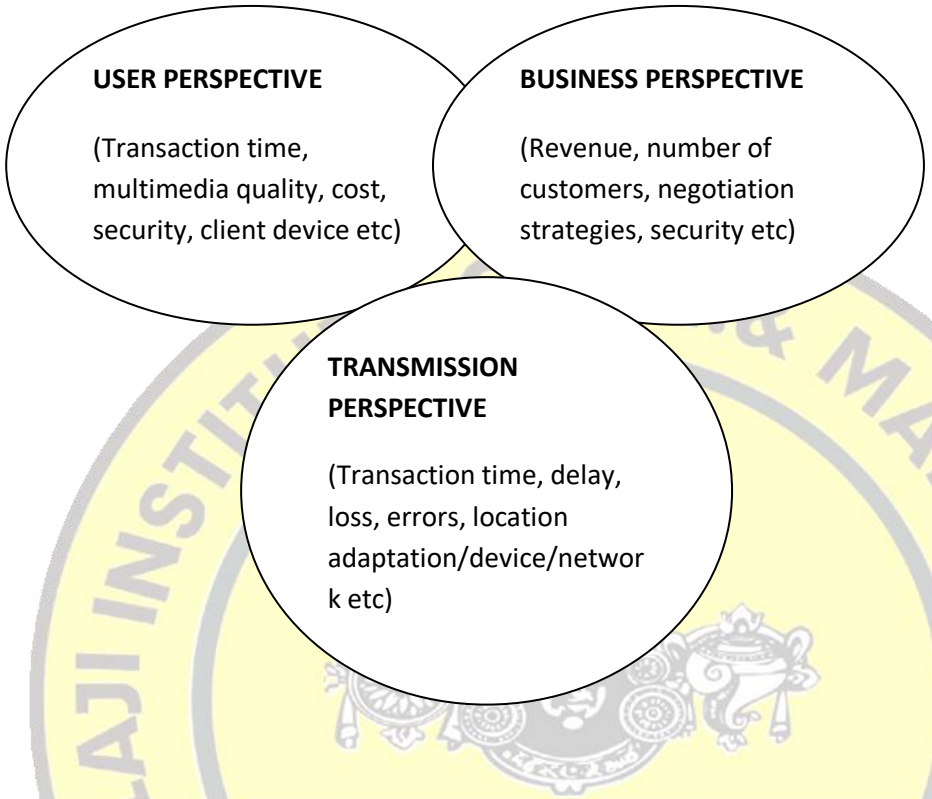


FIGURE: The Different Perspectives Of Multimedia Enhanced B2C M-Commerce

CONCLUSION:

In this topic we present an overview of QOS (Quality Of Service)- related issues and how they impact on the user experience with particular emphasis on m-commerce.

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