

# 1. Introduction to M-Commerce: When and How?

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Article One talks about the history of the origin of the mobile commerce (m-commerce), and how it is different from e-commerce. Then the evolution of the banks, telecom companies and merchants has been discussed in details. At last, the story behind e-money has been scrutinized- ending with a discussion on the future of m-commerce. The key takeaway is the evolution of the three industry segments that has a grave implication on development of m-commerce.

## 1.1 Introduction

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Currently sitting in a mall in MG Road in Gurgaon in an outlet of KFC, I just got a reminder of my pending bill for my internet usage in my e-mail attached to the Nokia handset; and I paid with my mobile just now. Trust me, it is not surprising enough. There was a time in India when in 2002, when people were charged 0.12 USD for an incoming call in India, and getting a basic handset would be a dream comes true for many. Since then, m-commerce alias mobile-commerce, and even mobile technology, has indeed come out a long way.

Historically, mobile-commerce services started in 1997, through the company 'Coca-Cola', through two 'Coca-Cola' vending machines, which were mobile enabled, and the machine accepted payment via SMS text messages. Using SMS, the Merita Bank of Finland launched the first mobile banking services in 1997.

In 2000, the mobile related services, started to take form. Norway launched mobile parking payments system; Austria offered train ticketing via mobile devices; Japan used this platform to offer purchase for air-line ticketing services. And that was just the start.

The company 'Apple' is on the brink of enabling a NFC enabled mobile payments through the smart device in 2014. 'Google' has launched 'm-wallet' or mobile-wallet in 2011. The m-commerce joint venture between Vodafone, O2, Orange and T-Mobile in June 2011 provided a necessary platform; and since the world has not looked back on the expectation from this ubiquitous device.

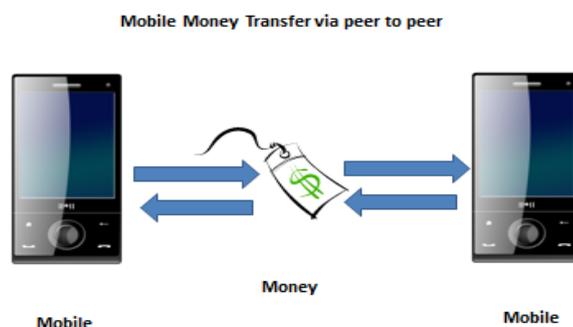


Figure 1.1.1- Illustration of mobile money transfer via mobile using a peer-2-peer network for mobile payments.

## 1.2 Now, what do we mean by m-Commerce?

Mobile Commerce or m-commerce was originally coined in 1997, which meant **"the delivery of electronic commerce capabilities directly into the consumer's hand, anywhere, via wireless technology"** (Wikipedia, 5). So, essentially we can say that m-commerce = e-commerce + wireless web: it has been forecasted that m-commerce will reach USD 700 billion in revenue in 2017-2018.

Essentially, mobile-commerce encompasses a range of mobile activities, from paying bills via SMS, USSD, or via WAP technology to swipe at POS for payment. It can be considered as a technology, service or product or a combination of these three. M-Commerce encompasses beyond just a transaction, it extends to provide services and information. Currently, we use this ubiquitous system for mobile money transfer, mobile ATM, mobile ticketing, mobile vouchers, coupons, and loyalty cards, content purchase and delivery, location based services, information services, mobile banking, mobile brokerage, auctions, browsing, mobile purchases, in-application mobile phone purchases, mobile marketing and advertising.

But, companies are also cautious of letting a big-bang happen at one go. Initial start has been on the focus on B2C (business-to-customer), which is slowly evolving to B2E (business-to-employee), and C2B (customer-to-business) and B2B (business-to-business) eco-system. In fact, these are not the only issues that m-commerce is facing.

The hand-held devices have a constraint for the features provided through the handsets. Input and output usage, security still remains an issue. Some business questions that pose issues are: How will the consumers adopt the latest technology? What are the incentives for the mobile commerce adoption? Can the companies create a sustainable value creation? What are the m-computing business models? How will the stakeholders' integration take place?

But, in order to understand the beauty of m-commerce, we have to investigate the history of telecom companies, banks, merchandise, early experiments based on smart phones, till the advent of mobile wallets while considering the future of money.

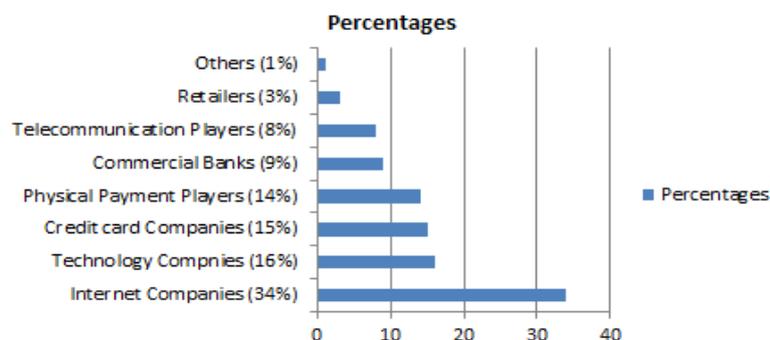


Figure 1.2.1: The share of the pie between companies in the mobile eco-system in the coming years. (Statistics taken from KPMG International Report 2012)

### 1.3 Evolution of Telecom Industry

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Historically, the evolution of telecom companies began with BT or British Telecom. It had its origin as Electric Telegraph Company in 1846. Only around three decades later, AT&T, founded by Bell, emerged in the US. Over the last 160 years, telecom companies focussed mainly on voice transmission.

The digital era brought in the quality of voice that was independent of distance. To assimilate rapid changes, the telephone network used special software programs for flexibility, routing, billing and so on. The coming of the wireless enabled the user to take the telephone instrument anytime-anywhere outside the wired world.

In the 1980s, this kind of mobility was restricted within the geographical boundaries. The lack of uniform standards did not help in the growth of mobile handsets. Hence, in 1982, CEPT or Conference of European Posts and Telegraphs came into existence to form a study group of GSM or Group Study Mobile, to develop of a pan-European public land mobile system; the main objective being to enhance a good quality speech, low terminal and service cost, international roaming and a new range of service within a greater compatibility. The rival CDMA or Code-Division Multiplier Access was born at the same time. During the Second World War, CDMA was used by England and her Allies, to transmit coded messages. Both these bodies still debate on a few common issues: better capacity for voice and data communication, leading to better NSR or noise-to-signal ratio, availability within efficiency, and overall quality user experience.

As the mobile telephony became popular in 1990s, pressure on frequency allocation also increased. In 1994, The FCC or Federal Communication Network, conducted auctions to provide spectrum to the TELCOs in the USA. This created a uniform method of raising coiffures through spectrum allocation, and a geography based model.

Now, even 4G is on the plate, after developments have occurred in 2G, 2.5G, and 3G. This accumulated the pressure to use more bandwidth, to exchange greater data packets through SMS, MMS, pictures, videos, and other services.

In the Indian context, the network is mainly driven by voice so far. Only recently, that the TELCOs based in India have raised data charges over voice expecting a change of customer behaviour and spending patterns. So far, there have been three main stakeholders- telecom companies, which provide the network or services, devices and equipment manufacturers, which provide the phone and infrastructure; and the consumers, who use these specified services.

But, with the enablement of the mobile transactions through the handsets or PDAs, there have been two more and important stakeholders- banks or financial institutions and retail merchants. Transaction enabling through the mobile for money and other payment purposes have enabled the advent of these major entities which has asked for a greater share of the pie, and hence the deadlock obtained so far.

In order to understand this deadlock, we have to go through the evolution of the banks and the merchants.

## Evolution of the Banking System

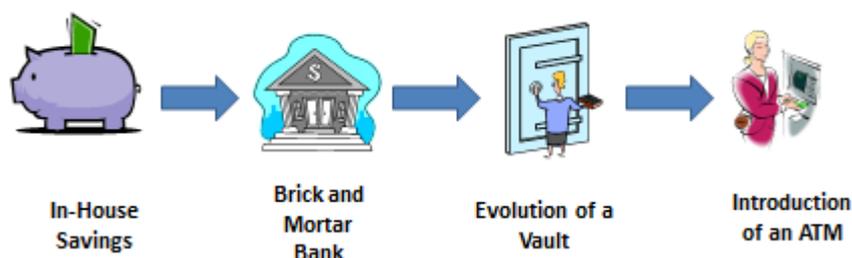


Figure 1.4.1: The evolution of banks.

### 1.4 Evolution of Banks

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Since the advent of the barter system in Babylon, any exchange of goods and services has been done without the use of currency, but by the goods alone. This payment could be in the form of a few cows in exchange of a few bags of wheat or rice. Unfortunately, the old transactions using a barter system were not legalized at all. To do this, physical currency were invented in the form of Gold, Silver and Copper coins, and then in the form of notes, and finally currency bills. Progression was made, and finally China issued its first currency as cowrie shells. This has indeed come to an evolution point where we have cash or non-cash transactions using electronic means, for example swiping a VISA card in Tokyo to buy a Malibu Rum in a bar.

The first major evolution beyond currency was the issue of bank paper cheques. The early part of the 20<sup>th</sup> Century witnessed the time for clearance as a major challenge, as it took a few weeks to clear after verification. With the advent of internet, in the late 20th century, both C2B and B2B witnessed a major change, as online transactions started to take place. However, the lesson that the concept of cheques gave was 'issuance', 'merchant acceptance', 'acquisition', 'settlement', and 'risk'. The cheques were widely accepted only if the retailer at POS had the ability to settle them, but this system opened up a significant cost without even realization.

Slowly and steadily, the bank started to think of an alternate system of payment, and credit cards came into existence. In 1950s, Diner's Club was introduced that could widely be accepted across the market segments. To connect to various geographies, banks got together and started two main co-operative ventures to create the necessary

standardization and process, across banking and retail industries. These ventures turned out to be MasterCard and Visa.

In the early days of credit card, banks could not answer the loss of payment of credit cards, which lead to non-performing assets of a bank. The consumers now expect MasterCard and VISA to leverage their strong brands, build expertise in risks, mellow down transaction costs, and add value-added services, especially through the proper channels. Large retailers have launched another lucrative cash-replacement instrument in the form of stored-value cards, which became quite popular. But here is the catch, while the banks tried to create and consolidate the lifestyle of their clients, the non- banking players started to pressure the banking entities on revenue sharing model for their involvement in the money arrangement. This reflected in the mind of the consumers as well. If someone had 500 USD, then he would probably keep 300 USD in the bank, while use the other part to deposit in the store-cards, and in advance payment to merchants and retail companies.

The issue remained. Some people were not able to pay all the money they had transacted through the credit card. The number of defaulters went on increasing. To offset that, secured credit-card or debit card was introduced. The debit cards had a direct connection to the bank account. However, security as an issue of debit cards, gave rise to a smart chip embedded in the debit card with a PIN. This led to the path to an infrastructure for payment gateways and network, which included equipment as the card reader and the settlement network, and as well as resources at the POS or point of sale.

As the computational facility of the computers improved, a vast data or information lay in the customer data related to deposits, withdrawal, loans, and so on. This big data became too big to handle, and the bank in order to get rid of this tedious process, started deploying pass-books which would be used to write the entries. The banks took a step forward by introducing self-banking system in the name of ATMs or Auto Teller Machines, which would run 24x7. It improved on the connectivity of the banks, which would allow any bank-issued debit or credit card to a interoperate using the network.

With the advent of the internet in 1990s, the banks or the settlement industry at large started with the bill payment facility online as electronic bill payment facility. Paypal was born to provide services to the internet, something beyond the close-loop network. But that was just the start. In the past couple of years, there has been a major perception shift as the new technologies; growth in the computer technology; growth in the mobile telephony has been a major challenge to the revenue sharing model for the banks. Mobile telephony and transactions have the potential to change this operating model, and are appreciating the fact that the mobile phone would be an asset to the customers with an embedded ATM inside the applications. Billions of mobile phones have a clear ability to transact, and the possibility of the TECLCOs having a greater share of the pie may not be as inevitable. In fact, new technologies will be able to leverage this existing infrastructure and create new models

of business. For a change, a bank might be able to offer the best advice to the local farmers through a call centre on the procurement, sowing, pricing, and transportation in India.

## 1.5 Evolution of Merchants

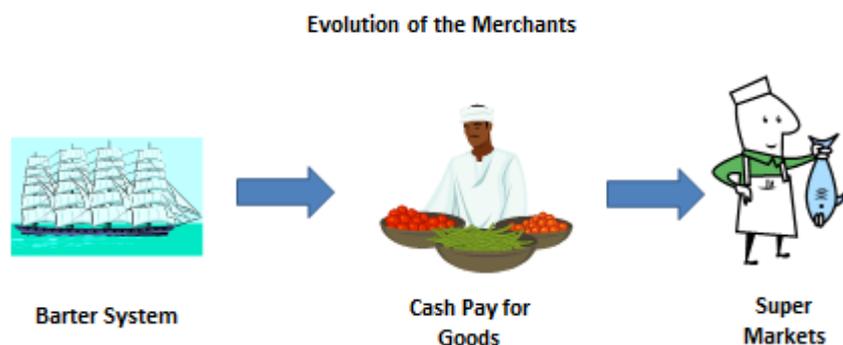


Figure 1.5.1: The evolution of merchants.

When the WTO or World Trade Centre was created, the WTO was masked in political considerations, hidden by policies related to the granting of subsidies and opening up the local market to the globe. WTO is recognised by its ability to use the global supply chains for local distribution. Merchandise and trade have become synonymous with globalization. Infact, merchandizing has grown to a point where bundled services have become a norm. For example, in the USA, like Best Buy or Circuit City sells product and service mix to its customers like credit cards, gift cards, installation services and extended warranties, all of which represent higher margin revenue. 'Recurring transactions' helped in gaining revenue through more volume sales in this gaming industry, which eventually delivered a recurring transaction-based business model.

Lifestyle management became the holy grail of all the merchants. It may not be a surprise, if Walmart continues to offer clinical advice to its customers at POS or point-of-sale. The personalization of consumers or customers led to this new mantra. Added to the advent of internet, real time inventory management and just-in-time practices took over. RFID or Radio Frequency Identification tags became a necessity in the big retail stores. Both of these findings provided the necessary tools for real-time interfaces for products and integration of services from multiple sources in numerous time zones. However, after the internet bubble bust in 2000s, and the scarcity of funds of the venture capitalists, several large internet providers such as Amazon, eBay, Google and Yahoo!, replaced the traditional brick-and-mortar players through online buying and selling. The ability to create virtual store fronts online, by buying and selling goods and services through internet has taken a permanent

place. Brick-and-Mortar stop shops were replaced with simple interface and creative business models.

This new model of online merchandising created a need of the companies to offer promotions and sales to attract the customers, with a release of deals and coupons in newspapers, magazines including special catalogues which were included in their own retail stores. A paper-coupon became a cash replacement instrument, and an entire industry was matured with this tag-line. Then came, frequent flyer miles, rewards in the form of accumulated points and finally cash back system. Cases of selling different cross-selling between the service providers started to gain pace. After the USA, Europe and Asia, coupon systems caught the entire world. Lastly, the mobile phones came into the picture with advanced features, and the start began for a new era. Coupons, deals, transactions through merchandizing started to happen in unison. Merchants started to leverage the exponential growth of mobile telephony over the years, creating a ripple in the market. But, that was just the start.

## **1.6 The Saga of e-Money**

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The magnetic stripe card was a product that started the movement of cash-less transactions. When any magnetic card is swiped against a stationary or moving sensor, the sensors communicated the user profile and data through its magnetic stripe over the ecosystem and eventually settle a transaction. The real-time communication led to the creation of EMV cards or Euro MasterCard Visa cards, also known as the smart cards. Smart cards are plastic cards which had an integrated circuit with them. This IC had the capacity for carrying out payments by special sensors, and it required a PIN or personal identification number.

These smart cards worked dismally in the USA in the start, as a combination of the cards worked against them. This included lack of interactivity in the user interface and the failure to generate the interest of all the stakeholders. Some of the stakeholders felt that there was no need to invest in this new technology.

With the coming of mobile phones as a ubiquitous device, the utility of smart cards seemed to be abated. In the late 1990s, when e-commerce was a buzzword, people used the internet to carry out B2B and B2C transactions. In 1998, the concept 'server-based wallet' came into the fore. Soon, a company 'GlobeSet' proclaimed that their digital wallet loaded in the server of the service provider, and was in compliance with SET or Secure Electronic Protocol, which was accepted by both MasterCard and VISA.

But unfortunately, although server-based wallets were held a great idea, it failed to address three basic things: the user interface was not adaptable to a new type of interface, the user credentials were not stored in the device but somewhere in the internet that might cause discomfort and security issues, and lastly the usability could be used only by online

merchants. To cater to these issues, a universally accepted solution was web-service based ID solutions. The e-money or electronic money took a major step in the early and late 1990s, where physical cash was stored off-line on cards embedded on chip or inside a computer's hard drive.

Infact, with the advent of mobile phones, smart card could be embedded in the handset to allow transactions in e-commerce, or rightly termed as 'm-commerce'. With the smart card storing and managing the true identity through the phone, it provided a real-time connectivity to the online merchants. Very soon, the infrastructure supported the transaction details in the SIM carrying the smart card details on them. But this allowed multi-tasking wish for the banks and telecom companies, each one of them wanting to perform as one another. This wish generated a new experiment with two different SIMs working as a connector to bank and telecom companies, but achieved no success.

In the early 2000s, several ideas on mobile commerce were floated, without having a final decisive eco-system. The concept of air-time allowed came into the picture, with a greater share of the revenue pie coming from the retailers who distributed these top-up scratch cards. The pre-paid air-time became an instant hit with several stakeholders coming up with many innovative solutions. Topping up air-time started to be considered as an alternative payment instrument. Banks started to introduce basic banking enquiry-based services. Infact some of the banks started fund transfers online at the same time. SMS was the major tool for enquiry-based services, with the constraint that SMS did not fulfil the real-time bank facilities, as money transfer or wire transfer.

There is a specific Premium SMS or PSMS that started predominantly in Asia and Europe to facilitate transactions based on user view informational data, as stocks, sport scores, travel info, and so on. This solution however failed to generate interest among the users, as it was not user-friendly. Moving beyond, the industry started two new technologies – client-based applications for mobile phones and proximity transactions. Banks started to allow contactless RF Plastic Cards to develop and NFC or near-field communication enabled cards to be used. Based on these, banking platforms were created for mobile handsets in Europe, without much success. Formally speaking, the ability of mass adoption has always been the mantra to a successful venture, while digitizing money still has a long way to progress.

## **1.7 Looking back a decade ago**

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The time line is 2001-2002. M-commerce has just arrived. Considered to be the new change "in your pocket", it epitomizes the new revolution of transactions through the handheld devices. Like any other product or service, m-commerce involves a number of activities.

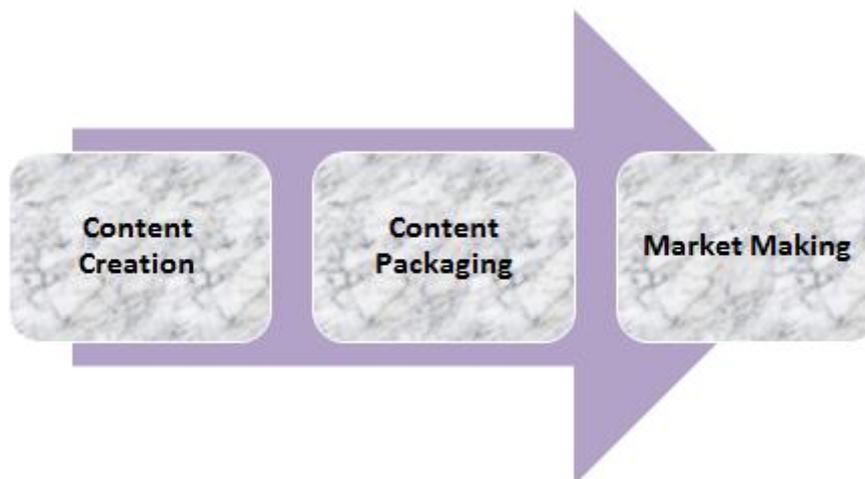


Figure 1.7.1: Value Chain of Content:

The basic model has six core-processes in two main areas: content and infrastructure and services.

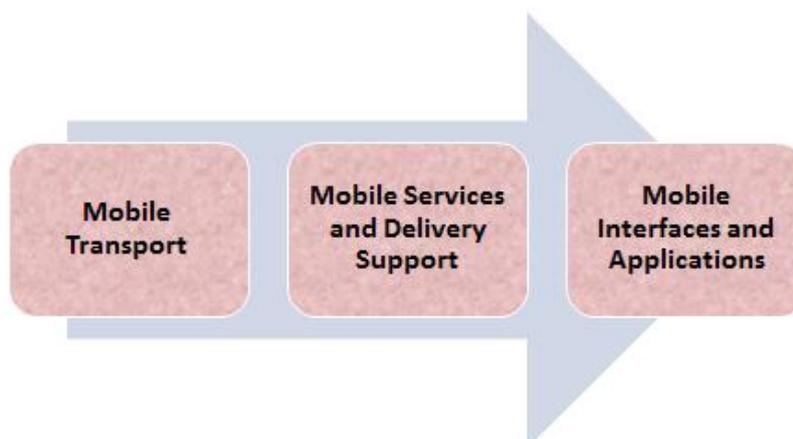


Figure 1.7.2: Value Chain of infrastructure and Services

**In content, these are the following:**

1. Content Creation - This focus is on value space in creating digital media such as audio, video and textual information.
2. Content Making - In this there are digitizing, formatting, editing, customizing, and the use of software to combine and package content.
3. Market Making- Marketing through proper channels in the market.

**In infrastructure and services, these are the following:**

1. Mobile Transport- The basic network involved in communications, including transportation, transmission and switching for voice and data.
2. Mobile service and delivery support- This involves infrastructure in connecting to the internet, security, server platform, and payment systems.
3. Mobile Interface and applications- The process of integrating the infrastructure systems- hardware, software and communications with the user.

**The future of m-commerce** – Key mobile network technologies will evolve with time to pave the way for future. There will be new transmission technologies, a good potential for WAP, a good potential for location-specific applications. Figure 1.2 gives the key technologies at 2002.

**Figure 1.7.3: Key mobile network technologies (2002)**

Standard	Description	Speed
Global System formobile communication (GSM)	Groupe Special Mobile is a standard made by European Standard Telecommunication Institute to develop second generation cellular networks	14.4 kbits/sec
Personal Communication Services (PCS)	A group of wireless communication capabilities that allows terminal capability, personal mobility, and management of service profile	14.4 kbits/sec
Personal Digital Cellular (PDC)	A 2G standard used explicitly in Japan	28.8 kbits/sec
High Speed Circuit Switched Data ( HSCSD)	An advancement of the circuit switched data, the original data transmission of GSM systems	57.6 kbits/sec
General Packet Radio Service (GPRS)	Packet-Oriented mobile data service on 2G and 3G communication systems	115 kbits/sec
Enhanced Data Rates for Global Evolution(EDGE)	A digital mobile technology that improves the data transmission rates	384 kbits/sec
International Mobile Telecommunications (IMT2000)	The third generation standard or 3G, which is used in voice telephony, mobile and fixed internet access, video calls and mobile TV	384 kbits/ sec - 2Mbits/ sec

Meanwhile, the key services will also progress to be a part of the ubiquitous services.

**Figure 1.7.4: Key mobile service technologies (2002)**

Service	Acronym	Description
Short Message Service	SMS	Basically short messaging services up to 160 characters that can be used through store-and-forward system
Multimedia Message Service	MMS	Messaging services using audio and graphics
Cell Broadcast	CB	Text messaging services with one-to-many broadcasting services
SIM Application Toolkit	SAT	Applications to update SIM cards. This data security and integrity requires WAP 2.0 standards
Wireless Application Protocol	WAP	WAP sites are hosted in web-servers, and use the same transmission protocol as HTTP, using wireless mark-up language(WML) and Extensible Mark-up Language(XML)
Mobile Station Application Execution Environment	MExE	This standard is used to include Java in the mobile phones.
Java 2 Micro Edition	J2ME	A newer version of Java language used for small devices
Information Mode	iMode	iMode uses a version of HTML for the provision of Web Pages
Information Application	iAppli	This is a new application based on Java which reduces the prolonged connection to a web-site
PDA Web Clipping	N/A	This technology allows to use PDA devices to access dynamic and updated HTML content using a modem
PDA Syncing	N/A	This allows PDAs to store the cash without a modem

The most important location-specific services and technologies will play the differentiating factor in the adoption of m-commerce.

**Figure 1.7.5: Key location-specific mobile technologies (2002)**

Technology	Acronym	Description
Bluetooth		A low-powered technology used to replace infra-red and cables within a distance of 10 metres
IEEE 802.11		A low-powered technology used in device activity especially in local area network (LAN)
Enhanced	E-OTD	Based on GSM, this works by sending information each time a

Observational Time Difference		service-provider is invoked
Time of Arrival	TOA	This involves more specific information than E-OTD
Cell of Origin	COO	This involves fixing the location for network customers, where the cell size is small
Global Positioning System	GPS	A technology developed by US military, but used extensively by people in 1990s
Assisted Global Positioning System	AGPS	GPS with mobile telecommunication network is used within 50 metres

### Conclusion

M-commerce has invoked a change in our daily lives- how people work, live, learn and so on. The wireless internet will be driven by WAP, iMode, GPRS, and 3G. A fresh and creative attitude will shed new light in the coming years, and hence be a part of a rapid growth in the next decade, starting from 2002. Now, we have to answer

1. What has been the role of WAP in the coming years?
2. What are the others location-specific services that can be designed in the future?
3. What is the difference in GPS and AGPS services?
4. What is GIS all about? What are the applications of GIS?

Mobile Commerce = Mobile + E-Commerce

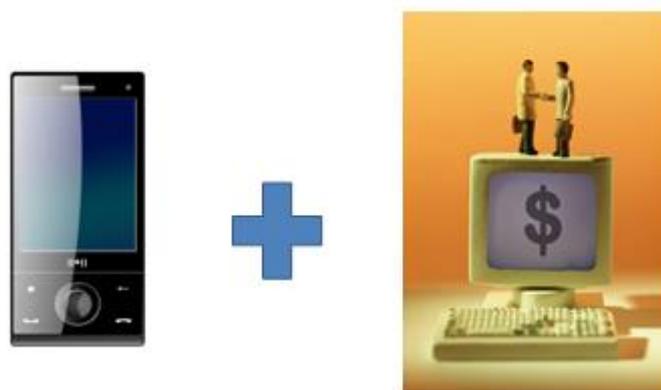


Figure 1.8.1: The equation of m-commerce.

## 1.8 The future of m-commerce

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Lot of it being said and done, will the future hold good? Will an eco-system prevail for a good experience of the customers and consumers? Will the “Red Dragon” and the “Elephant” be the first to roll-out requirements on mobile banking and mobile money? Will the NFC eco-system used by ‘Apple’ explode or implode? Will the micro-transactions hold a value in well-developed markets? Will the usage of ATMs decrease? Will there be a sound and solid network of security and trust in the entire eco-system? Will mobile money use multi-currency system beyond geographical boundaries for payment and remittance? Will regions accept a regional currency for trade and commerce? Will more and more financial and non-financial transaction services appear on mobile phones driving adoption? Will this ubiquitous device allow simplicity, convenience, and flexibility to the end users and customers?

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