

Ubiquitous Commerce: The New World of Technologies

Sunil Kumar^{*}, Padmaja Joshi, Zia Saquib

E-Governance Group, Centre for Development of Advanced Computing (CDAC), Delhi, India

Abstract

Developments in mobile communications and ubiquitous computing have heralded an era of ubiquitous commerce (u-commerce). This paper studies the concept of ubiquitous computing and its adaptation to commerce with new issues associated. With the rapid advancement in field of networking and communications, no aspect of human life is untouched. Commercial activities are also affected by the new advancements. Any time/ always/ anywhere service providing is the key to this ultimate or ubiquitous commerce. Commerce that offers unique and personalized service to every customer individually using ubiquitous networks is called u-commerce. U-commerce is abbreviation that stands for ubiquitous commerce, also called ubicomp or ultimate commerce. U-commerce represents the next phase of commerce, which is initiated by electronic commerce (e-commerce) and propagated by mobile commerce (m-commerce). In this paper, we look into the basic construct or building blocks of U-commerce and what are the obstacles faced in its implementations. U-commerce is combination of e-commerce, m-commerce, television, voice and silent commerce. It can be seen as extension of current types of commerce, but not as their replacement. Main u-commerce characteristics are described using the four u-constructs: ubiquity, universality, uniqueness, and unison. Although U-commerce brings many benefits the principal obstacle to u-commerce development and adoption are customer concerns for their privacy protection.

Keywords

Ubiquitous Commerce, U-commerce, Ubicomp, Privacy Concerns, Personalized Service, Personalization, Security, Ubiquity, Uniqueness, Universality, Unison

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1. Introduction

Ubiquitous commerce, also referred to as “u-commerce” is a new paradigm that broadens and extends the Internet usage of today’s environment. With the rapid development of ubiquitous computing and mobile communication technologies, the traditional business model is changing drastically. U-commerce emerges as a continuous, seamless stream of communication, content and services exchanged among businesses, suppliers, employees, customers, and products.

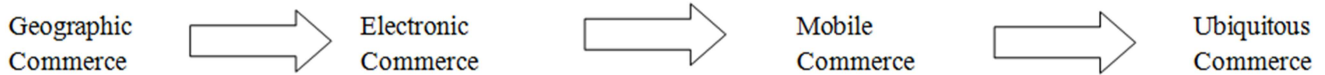
U-commerce refers to “the use of ubiquitous networks to support personalized and uninterrupted communications and transactions between a firm and its various stakeholders to provide a level of value, above and beyond traditional commerce” (Watson, Pitt, Berthon, & Zinkhan, 2002) [1].

Sheng (2006) identified these stakeholders that included customers, suppliers, governments, financial institutions, managers, employees, and the public at large. Galanxhi-Janaqi and Nah (2004) [2] identified that u-commerce extends beyond traditional e-commerce by integrating wireless, television, voice and silent commerce. However, its

* Corresponding author

E-mail address: skumar@cdac.in (S. Kumar)

full realization would bring something more than the simple sum of its components. [3]



2. Characteristics of Ubiquitous Commerce

Watson mentions in his paper “U-Commerce: The Ultimate”

<i>Ubiquity</i>	=	<i>Reach ability</i>	+	<i>Accessibility</i>	+	<i>Portability</i>
<i>Uniqueness</i>	=	<i>Localization</i>	+	<i>Identification</i>	+	<i>Portability</i>
<i>Universality</i>	=	<i>Mobile Networks</i>	+	<i>Mobile Devices</i>		
<i>Unison</i>	=	<i>Mobile Applications</i>	+	<i>Data Synchronization</i>		

Ubiquity: It means that computers will be everywhere, and every device will be connected to the Internet. It is this omnipresence of computer chips that will make them “invisible,” as people will no longer notice them (Watson et al., 2002). For example payment technology is becoming ubiquitous shattering past constraints of location and functionality. It can now connect the smallest rural community, enabling it to conduct commerce with the rest of the world.

Uniqueness: Junglas and Watson (2006) define uniqueness as the “drive to know precisely the characteristics and location of a person or entity” and it incorporates three lower level constructs: localization, identification and portability. Uniqueness means that the information provided to the users will be easily customized to their current context and particular needs in specific time and place.[5]

Universality: means devices are universally usable and multi-functional. Due to Internet and satellites your desktop, laptop, cell phone, or PDA will avail free mobility and lots of information at any time.

Unison: covers the idea of integrated data across multiple applications so that users have a consistent view on their information-irrespective of the device used. Consistency means if I change an address in my phone book it should reflect changes in my cell phone, calendar and other devices simultaneously. In au-commerce environment, it is possible to integrate various communication systems such that there is as single interface or connection point to them.

3. Components of Ubiquitous Commerce

Each u-commerce element uses positive characteristics of other elements and modifies it according to newer and

in 2000 that: U-commerce should be the ubiquitous, universal, unique and unison. In 2006, Watson made further description about these four characteristics in the literature [4]. He pointed out that:

sophisticated customer needs. We can view u-commerce as a conceptual extension of e-commerce and m-commerce. U-commerce is a new environment that combines wireless, television, voice and silent commerce with traditional e-commerce.

3.1. Electronic Commerce

The e-commerce is modern business methodology that addresses the needs of organizations, merchants, and consumers to cut costs while improving the quality of goods and services and increasing the speed of service delivery, by using Internet. It differs from the traditional commerce in the way that it enables the trading of goods, money and information electronically from computer to computer. E-commerce is the most established type of commerce performed through digital means.

3.2. Wireless Commerce

Wireless e-commerce (also called mobile commerce or m-commerce) is the promotion, buying, and selling of goods and services through electronic data communication networks that interface with wireless (or mobile) devices. Wireless e-commerce is a subset of wireless computing, which is the accessing of information systems by wireless means.

Wireless commerce is a key part of u-commerce, because it creates the possibility for communications between people, businesses, and objects to happen anywhere and anytime. Mobile and wireless devices are enabling organizations to conduct business in more efficient and effective ways. Wireless devices can offer many advantages for companies and individuals, such as empowering the sales force, coordinating remote employees, giving workers mobility, improving customer service, and capturing new markets.

3.3. Voice Commerce

Voice commerce (also known as V Commerce) is user interaction with a commercial website that incorporates voice recognition technology. Rather than the traditional point-and-click method of making choices, the user speaks into a microphone and makes selections as spoken words and phrases. An increasing number of businesses are using computerized voice technologies: speech recognition, voice identification, and text-to-speech. Voice commerce enables businesses to reduce call-centre operating costs and improve customer service. Companies are mostly pursuing voice commerce as a part of a multichannel strategy.

3.4. Television Commerce

Television commerce is a shopping medium that uses a television network to present products and process orders. Television commerce refers commonly to transactions made through new functions of interactive or connected TVs, also called smart TVs.

Television commerce is mainly used as an end-consumer channel. Since it can reach a wide range of the population, governments may also use it to deliver their services. The interacting TV integrates software and set-top boxes to facilitate digital interactive television with many capabilities, including “time-shifting” content and filtering advertisements.

3.5. Silent Commerce

Silent commerce uses advanced tagging and sensor technologies, as well as wireless mobile communications, to make everyday objects intelligent and interactive, creating new information and value streams. Silent commerce creates and captures value by deploying intelligent, interactive objects and machines that communicate with one another without human intervention. Silent commerce is enabled by technologies ranging from global positioning systems (GPS) to radio frequency identification (RFID). For example, radio frequency identification (RFID) chips allow the tagging, tracking, and monitoring of objects along an organization’s supply chain. An important advantage of RFID, as compared to technologies like barcodes, is its ability to identify and track individual assets, while barcodes can only identify classes of assets. Micro electro mechanical systems (MEMS) chips combine the capabilities of an RFID tag with small, embedded, mechanical devices, such as sensors. [6]

With more advanced silent commerce applications, it will be possible for organizations to identify, track, and monitor every single product along the entire supply chain, and even after the sale, up to the point when the product is recycled.

4. Drivers for the Growth of U-commerce

Several characteristics of u-commerce will drive its growth. Ubiquitous continuous presence, the ability to capture context through sensors, and the ability to communicate with service providers make u-commerce attractive to businesses. Further, there are three global phenomena that will accelerate the growth of u-commerce:

4.1. The Pervasiveness of Technology

History has clearly demonstrated that technology, properly applied, drives efficiencies, productivity, and value. As technology becomes more pervasive think of the explosive growth of nanotechnology as well as ongoing capital investments in technology at the enterprise level there is a larger platform on which to leverage innovation and new applications.

4.2. The Growth of Wireless

Wireless is one of the fastest-growing distributed bases: wireless networks have expanded around the globe; mobile phone usage and new applications have also exploded. The potential of wireless is not limited to consumer applications. Wireless commerce is, therefore, a critical component of u-commerce.

4.3. Increasing Bandwidth and Connectivity

Bandwidth has been doubling every nine months or roughly at twice the growth rate of computing power. It is not hard to imagine a world where IPv6 potential and promise may come to be realized and interactivity is possible in appliances as ubiquitous as televisions, medicine cabinets and refrigerators. In the future, the Internet will always be “on.” These are very powerful and far-reaching phenomena that can clearly drive all sorts of business models. Realizing the full vision of u-Commerce – commerce that is universal, seamless, and secure will require a great deal of effort in a number of key areas.

5. Technology Shift from E-commerce To U-commerce

5.1. E-commerce to M-commerce

- Portability:
Customer’s device can be taken almost anywhere.
- Reach ability:
M-commerce service can contact the customer at any time and any place.

- **Accessibility:**
Customer can contact m-commerce service at anytime from anywhere.
- **Localization:**
M-commerce service can locate person and provide value-added services to customer based on geographic location.
- **Identification:**
M-commerce service can identify who customer is.

5.2. M-commerce to U-commerce

- **Ubiquity = reach ability + accessibility + portability**
The customer can be reached by and can reach the m-commerce service anywhere, anytime
- **Uniqueness = localization + identification + portability**
The customer's location and identity can be uniquely identified by the m-commerce service
- **Universality = device + network**
Universal usability of mobile technology for customer with multiple functions
- **Unison = application + data**
Data is kept in unison and is usable with multiple applications on multiple devices by customer

6. U-commerce Barriers

Creating a u-commerce environment characterized by pervasive, continuous and seamless interactions requires breaking through a “wall.” Beyond this wall development activities can proceed at an accelerated pace. This “wall” consists of a number of fundamental factors that need to be addressed, which we call the four S’s: systems, standards, security, and simplicity.

6.1. Standards

Common standards are a necessity. They allow devices to “speak the same language.” Much in the same way the Open System Interconnection (OSI) model describes how applications and devices should communicate, or how Transmission Control Protocol/ Internet Protocol (TCP/IP), a subset of OSI model for the Internet, describes Internet standards, new interoperable standards are needed throughout the u-commerce environment.

6.2. Security

As money and information become more digital and are

transmitted across more devices, channels and borders, the security of the transaction becomes increasingly more critical. Two of the key challenges in such an environment are to extend the same kind of security that exists in the physical world to virtual transactions and to ensure the privacy of users involved in the transactions.

Today, losses due to fraud are less than one tenth of one percent of global sales volume. Extending the same level of security to new payment channels is imperative and should focus on two key areas –authentication of the parties involved in a “virtual” transaction and ensuring that the privacy of account data is preserved no matter where it resides in the payment chain.

6.3. Systems

Given the number of players likely to be involved in any u-commerce scenario, it is unlikely that one player will ever control the end-to-end system. The alternative is to create more connectivity between systems. But this is complex given the multiple data bases and legacy systems likely to be accessed. The IT initiative increases the ability of infrastructure to handle the projected demands of u-commerce by opening up the system and allowing greater access at the endpoints.

6.4. Simplicity

Perhaps the most difficult challenge is integrating technologies in a way that is both compelling and simple. Without simplicity and ease of use, failure in the consumer environment is almost guaranteed. The marketplace is littered with consumer applications that failed because of irrelevance, complexity or prohibitive adoption costs. In this emerging world of u-commerce, sustainable technologies will be those that not only make life more convenient, but also make it simpler.

7. Personalization and Privacy Paradox

Personalization can be achieved by using information that was either obtained or collected previously or that is obtained in real time. An enormous amount of information will become available in the u-commerce environment, which provides opportunities for service providers and merchants to deliver personalized products and services. This is also evident from the “uniqueness” feature of U-commerce which incorporates the ideas of identification, localization, and portability. Advancements in networks, applications, devices, and data synchronization allow service providers to identify users based on who they are and where they are at any time in order to provide highly relevant services in real-time.

Hence, personalization in u-commerce can be characterized as having three dimensions – identity, time, and location.[7]

Personalization within u-commerce has three dimensions: identity, time and location. Identity is based on collected information, which is attached to an individual. U-commerce enables that a service could be delivered to the customer in any time and any place. On the other side customers can benefit on customized products and services. However personalization of services increases customer awareness of the need for the security of private information. U-commerce technologies are offering a promise of intelligent systems which are everywhere and which could be customized to current customers' context. [8]

Personalization in u-commerce can change or enhance not only the way organizations deliver their products and services to customers, but also the interaction between businesses and customers in time and space. Personalization enables: 1) services based on the identity and preferences of customers; 2) real-time access to information or alerts to keep customers informed or updated; and 3) location-based services. Therefore, personalization is a key value driver of u-commerce.

Although personalization brings lot of benefits, the most critical disadvantages is the fact that customer must submit own supplier with lot personal information. Relationship between personalization and privacy can be defined as “personalization-privacy paradox”. Personalization-privacy paradox could be evaluated through two views: a) through a company view and b) through a customer view.

Company is evaluating this paradox according to total investments in personalization. Personalization investments are high and very often return of investment is on long run. As higher is personalization level, volume of needed information is higher. Higher level of personal information is leading to higher level of privacy damage risk. On one hand there is customer need for the higher level of personalization. On the other hand customer is intending to reduce volume of information which he would be ready to give to the suppliers. When a customer allows collection of private information, he is representing himself to public. Customer is, like in real life, giving to public definition on himself, defining own identity. [9]

Personalization process within u-commerce is collecting information on customers who are memorized in a mobile device. However this process increases customer's concern on the privacy protection issue. As soon as the customers are becoming aware of private information collecting process and of the way this information could be used, they are usually reacting in a way that they want to control volume and quality of private information disclosure [10].

Privacy issues are getting on importance in u-commerce environment. On one hand there are factors such as usage of sensors, wireless devices and devices which are improving security, efficiency and simplicity. On the other hand there are discussions on negative implications of u-commerce systems because of possible mismanagement of private information and because of fear of losing control over private information. There is increasing demand for privacy sensitive ubicomp system. Privacy could be one of major barriers in long term development of u-commerce systems. [11]

In u-commerce, data is increasingly collected without any indication (e.g., there is no indication from the devices that data is being recorded); data is continuously being collected without any predefined purpose data will be collected and integrated from various devices, thus offering different viewpoints – the combination of these different views from different devices enables recognition and identification of the users. Once data is collected, it will be permanent and is not likely to be deleted due to the declining cost of data storage. Privacy concerns have become the biggest social issue in u-commerce. Privacy concerns pose a major barrier to the adoption and long-term success of u-commerce applications. [12]

8. Conclusion

Our preliminary study is focusing on recognition of u-Commerce concept in realizing the promising of u-commerce. U-commerce is not just a phenomenon; it is also an organizing principle. As technology rapidly drives the convergence of many different spaces – information, entertainment, financial services, payments, communications – u-commerce can help us think more expansively and holistically. It's a vision that compels us to transcend borders – be they geographic or technological – and build links. And it's a vision that reminds us technology is valuable only in so far as it makes sense to the user – somehow making his or her life more convenient, more interesting and more productive – and presents a clear business case.

The evolution we are witnessing and want to help drive is the evolution of the “smart commerce.” This is a commerce that is more flexible, fluid, interconnected, efficient and resilient. We believe u-Commerce will be both a driver and an outcome of the smart commerce with the mobile technology growth. The smart commerce is poised to grow explosively, with many players from multiple industries all vying for the customer's attention. These players will be offering new services, new payment tools, and a host of new ways to get access to goods and services anytime, anywhere, and any way due to mobile technology. U-commerce represents the next step in digitization as true ubiquity has profound implications.

U-commerce has heritage of the benefits and threats coming from e-commerce and m-commerce. Personalization benefits and privacy damage threats are creating so called “privatization-privacy paradox” that in u-commerce environment represents main obstacle but also main driver for future u-commerce systems development. The evolution of e-commerce into m-commerce had led us to a world of ubiquitous commerce (u-commerce). U-commerce is facilitated by the emergence of four U-forces; ubiquity, universality, uniqueness and unity. This paper has explored the issues surrounding adaptation of Ubiquitous computing into commerce to make u-commerce systems. However, a great effort is still required to adopt the latest advancements in the field of commerce.

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