

Future Directions of Information and Telecommunication Systems Through the Technological Advancement Convergence

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Abstract

This paper presents the significant trends on the technological developments that hold relevance to the evolution information and telecommunication systems to allow faster communication and immediate actions concerning the different enterprises, organizations (both public and private), and businesses, hence, it will ensure thru high productivity. Some of these developments in digital revolution are cloud computing, mobilization and miniaturization of computing, and the evolution of wireless technologies. The convergence of these technological advancements will be integrated to information and telecommunication systems.

Keywords: *information and telecommunication systems, cloud computing, smart devices, wireless networks*

1. Introduction

Communications technology is considered the catalyst for conveying information for enterprises, government and non-government organizations, businesses and all other sectors of the society. The emerging trends and convergence in Communications Technology creates a great impact on their Information and Telecommunication systems. The enterprise's success or failure depends on a great extent to the technologies being used. These technologies need to be upgraded every now and then in order to serve its purpose to the fullest rate.

Heads of these enterprises, organizations (both public and private) and businesses are faced with problems on how to send communications to their home-based units whenever they are on travel or on business trips. They are most likely looking forward for a solution that can address these needs and a wireless technology that will help them provide the information much needed to their organization.

This paper introduces the significant trends on the technological developments that hold relevance to the evolution information and telecommunication systems to allow faster communication and immediate actions concerning the different institutions, organizations, and businesses, hence, it will ensure thru high productivity. Some of these developments in digital revolution are cloud computing, mobilization and miniaturization of computing, and the evolution of wireless technologies.

The rest of this paper is organized as follows: Section 2 discuss significant trends on the technological developments that creates an enormous impact to information and

telecommunication systems; Section 3 shows the integration of the convergence of technological advancements to information and telecommunication systems; and the concluding remarks in Section 4.

2. Technological Advancements for Information and Telecommunication Systems

2.1 Cloud Computing

Cloud Computing (Figure 1) is considered as an Internet-based computing, wherein the use of computing resources (hardware and software) are provided and delivered as a service over a network (typically the Internet) that enables users to access an elegant, small, and simplified subset of information on a handheld device anywhere with connectivity [5, 6]. Data and information are created and stored in such a way that is readily accessible to any wireless device in the “cloud” and computing becomes a utility wherein the net becomes the summation of computing resources. The opportunities provided by cloud computing becomes available to individual users and client-enterprises of all sizes that enables them to deliver more scalable and resilient services to employees, partners and customers at lower cost and with higher business agility [1].

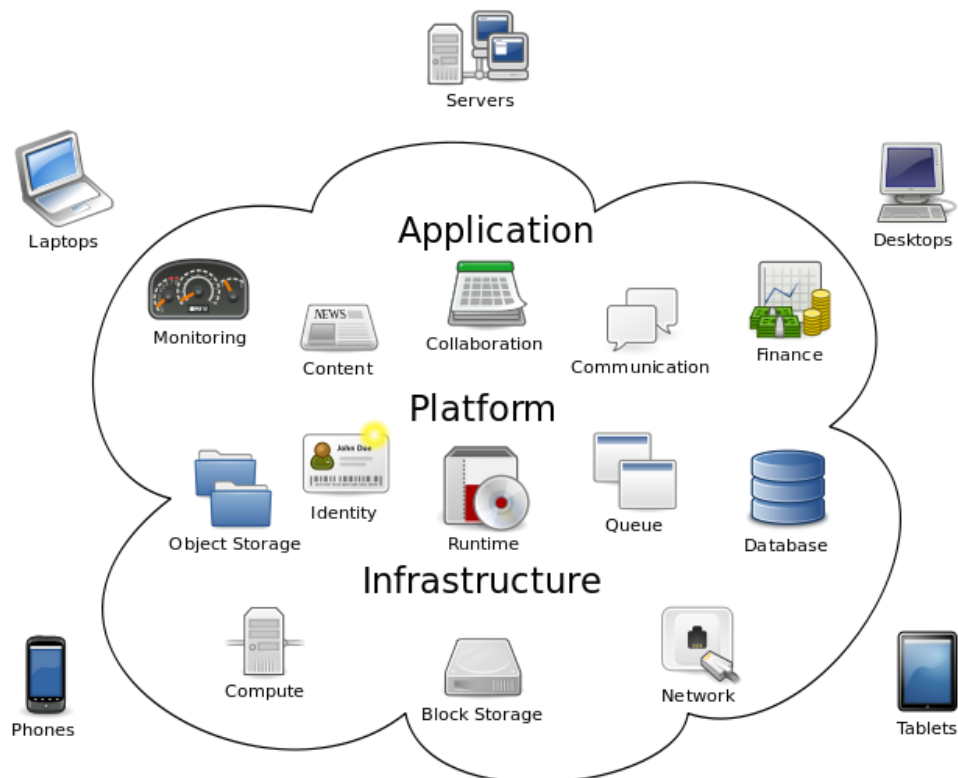


Figure 1. Cloud Computing [3]

2.1.1 Software-as-a-Service (SaaS): Software as a service features a complete application offered as a service on demand [2]. It delivers applications through a web browser to millions of users or client organizations using a multitenant architecture.

SaaS has no upfront investment in servers or software licensing on the user side and on the provider side, with just one app to maintain, costs are low compared to conventional hosting [4]. The most popular example among enterprise applications of SaaS is salesforce.com, Google Apps, Zoho Office, and etc.

2.1.2 Platform-as-a-Service (SaaS): Platform as a service encapsulates a layer of software and provides it as a service that can be used to build higher-level services [2]. It delivers a platform by integrating an OS, middleware, application software, and even a development environment that is then provided to a customer as a service. It provides for every phase of software development and testing, or they can be specialized around a particular area such as content management.

PaaS delivers development environments as a service [4]. Users can build their own applications that run on the provider's infrastructure and are delivered to the users via the Internet from the provider's servers. Popular examples of PaaS include Google Apps Engine, which serves applications on Google's infrastructure; Salesforce.com's Force.com; Coghead; Yahoo Pipes or Dapper.net, for extremely lightweight development wherein cloud-based mashup platforms are abundant.

2.1.3 Infrastructure-as-a-Service (SaaS): Infrastructure as a service delivers basic storage and compute capabilities as standardized services over the network [2]. It includes servers, storage systems, switches, routers, and other systems are pooled and made available to handle workloads that range from application components to high-performance computing applications. Examples of IaaS include Amazon Elastic Compute Cloud (EC2), Joyent, Rackspace, and IBM Computing on Demand.

2.2 Wireless Communications

The “anywhere and anytime connectivity” have been increasingly delivered by the recent developments in wireless communications. Wireless networks refer to any type of computer network that is not connected by any kind of cables. It utilizes a transmitter (e.g. wireless router or access point) that is hardwired to an Internet connection as shown in Figure 2. The other computers or wireless devices are connected through this access point that acts as a gateway to interconnect these devices in the network and to the Internet [7].

Increasingly emerging wireless technologies that together are furthering the anywhere and anytime access to digital communication that are being miniaturized are the advent of Wi-Fi, 4G or the 4th Generation Networks, and RFID tags (radio-frequency identification). These new developments in wireless networking and computing will facilitate the implementation of information and telecommunication systems, thus offering vast variety of uses by both business and home users. Wireless networks are considered unobtrusive and are easy to set up and inexpensive.

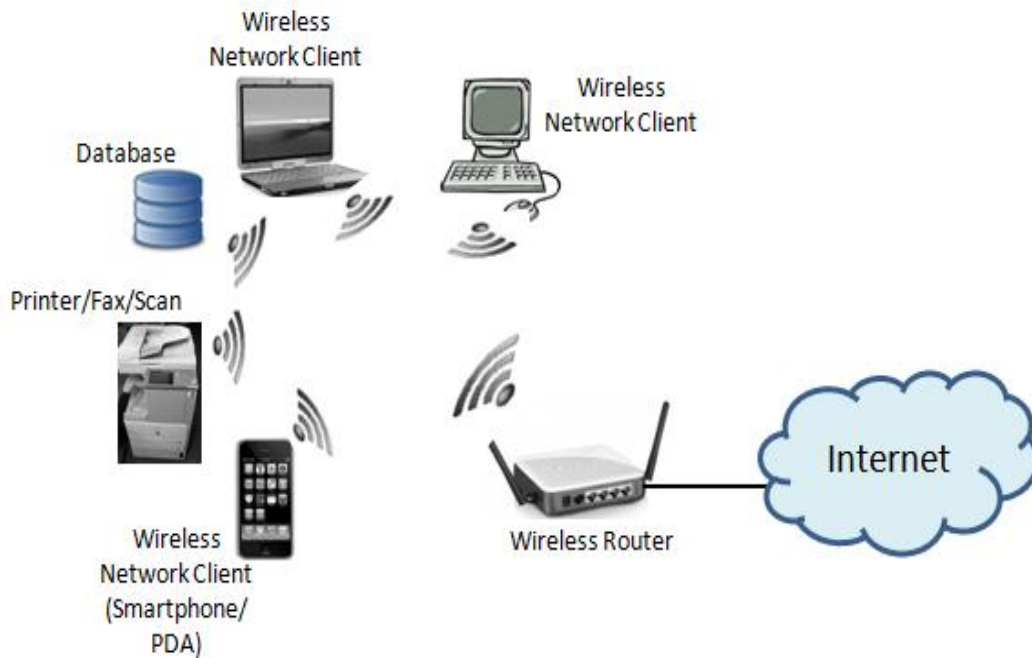


Figure 2. Wireless Networks

2.3 Evolution of Smart Devices

Mobile devices to become more powerful have made possible through the technological breakthroughs in the miniaturization of processors, networking technologies, memory, displays and sensors. A smart device refers to an electronic wireless, mobile, always connected (via WiFi, 3G, 4G, etc.) and is capable of voice and video communication, internet browsing, "geo-location" (for search purposes) and that can operate to some extent autonomously [8]. Most popular portable and mobile devices nowadays such as Netbooks, Smartphones, personal digital assistants (PDAs), portable media players, global positioning systems (GPS), Apple iPhone and iPad, followed by devices such as the Samsung Galaxy tablet and other mobile internet devices. Figure 3 shows some examples of smart devices.

Smart devices can be considered a ubiquitous computing device: a device that exhibits some properties of ubiquitous computing including artificial intelligence. Smart devices can be designed to support a variety of form factors and a range of properties pertaining to ubiquitous computing and also be used in any combination of three main system environments: physical world, human-centred environments and distributed computing environments.



Figure 3. Smart Devices

3. Technological Convergence for Information and Telecommunication Systems

Information systems refers to the combination of data processing hardware and software in the collection, processing and distribution of data to and from interactive computer-based systems to meet the informational needs of an enterprise or an organization. Telecommunication systems refer to telephone equipment and transmission facilities, either alone or in combination with information systems, for the electronic distribution of all forms of information, including voice, data and images. The convergence of technological advancements has a great impact on the success of the modernization of information systems as well as with the telecommunications systems.

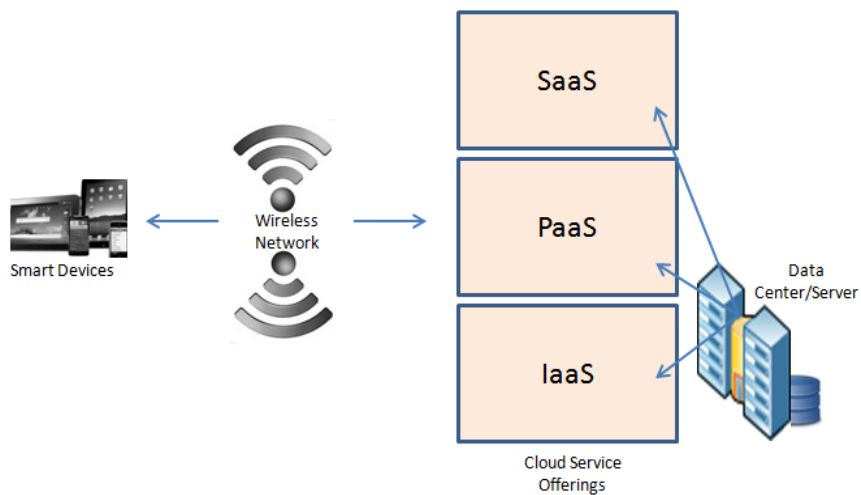


Figure 4. Technological Convergence

Figure 4 shows the integration of the convergence of the technological advancements into information and telecommunication systems. The smart devices will be the medium of the individual users or client-enterprises. Smart devices may access or offer one or many services from other devices. These smart devices are connected via wireless networks to gain access for information. Cloud computing will be utilized for the delivery of services and information as needed by the users and client-enterprises.

4. Conclusions

This paper presented the significant trends on the technological developments that hold relevance to the evolution information and telecommunication systems to allow faster communication and immediate actions concerning the different enterprises, organizations (both public and private), and businesses, hence, it will ensure thru high productivity.

The technological developments in digital revolution include cloud computing, mobilization and miniaturization of computing, and the evolution of wireless technologies. The integration of the convergence of these technological advancements creates an enormous impact for the development of Information and Telecommunication systems.

Acknowledgements

This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (2010-0024401, 2011-0026286, 2012-0007273).

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