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A Review on Market Trends and Applications on Mobile Cloud Computing

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Abstract

The market for mobile cloud computing among personal cloud market is growing because of the growth of mobile application and the constraints on the performance of mobile devices such as smartphone and tablete PC. At first, we take a look at the market trends of mobile cloud compuing by dividing that into SaaS, PaaS, and IaaS, and mobile cloud application is discussed in more detail. Next, the technologies for mobile cloud computing are introduced, and we reasearched the worldwide and South Korea market scale of mobile cloud application parts. This paper gives an overview of market trends, architecture, and applications for mobile cloud computing.

Keywords: Mobile cloud computing, mobile cloud applications, market trends

1 Introduction

We discuss on mobile cloud computing (MCC) among personal cloud computing areas. In recent years, applications targeted at mobile devices have started becoming abundant with applications in various categories such as entertainment, health, games, business, social networking, travel and news [1]. We can always use a number of applications in Apple app store and Android market. The reason for the popularity is the efficiency and the convenience with rapid mobile technological advance.

However, mobile devices have original problems such as low bandwidth, availability, heterogeneity, pricing, computing offloading, security, authentication, and data access [2, 3]. As an alternative for these challenges, this paper introduces mobile cloud computing.

The remainder of this paper is organized as follows: Section 2 shows market trend of mobile cloud computing. Section 3 explains technologies with MCC. Section 4 describes some examples of MCC. The paper ends with conclusions in Section 5.

2. Market trends of mobile cloud computing

By the Cisco Global Cloud Index, annual global cloud IP traffic will reach 5.3 zettabytes by the end of 2017. By 2017, global cloud IP traffic will reach 443 exabytes per month (up from 98 exabytes per month in 2012). Global cloud IP traffic will increase nearly 4.5-fold over the next 5 years. Overall, cloud IP traffic will grow at a CAGR of 35 percent from 2012 to 2017. Global cloud IP traffic will account for more than two-thirds of total data center traffic by 2017 [4].

Table 1. The scale of cloud market prospect (unit: million) [5].

Parts		2013	2014	2015	CAGR(%)
SaaS	Application	17,470	20,580	21,300	20.4
PaaS	Application development	6,075	8,618	11,370	39.2
IaaS	System infra S/W	8,877	11,345	14,480	27.4
	Server	6,000	7,548	9,873	30.8
	Storage	5,414	7,366	10,238	38.9
Total		43,837	55,457	67,261	27.4

** IDC, Gartner, 2010*

According to Gartner Research in Table 1 [5], the worldwide market for SaaS will be worth $21 billion in 2015. South Korea market for cloud computing will represent annual growth rate of 47.6 percent and will be worth $460 million in 2014. The transition of software from licensed to service models continues, but it has yet to reach break through proportions (9.6% in 2010, rising to 13.8% in 2015).

Table 2. The world market scale of mobile cloud application parts (unit: million) [5].

Parts	2013	2014	2015	CAGR(%)
Game	342.9	410.5	513.2	25
Business Application	8,283.8	10,637.1	19,785	86
Search	567.3	638.8	996.5	56
Social Networking	1,283.5	1,469.9	2,293.1	56
Utility	5,201.9	6,287.5	9,745.6	55
Total	11,081.5	19,488.8	33,333.5	39

* ABI Research, 2009

According to ABI research, Table 2 [5] shows prediction for market growth in mobile cloud application parts. The most important part is Business Application and Social Networking in aspect of both market scale and growth rate. And mobile cloud computing is mainly associated with Search, Social Networking and Game parts. In our opinion, Game part is more worthy than the result of ABI research in South Korea.

3. Technologies with mobile cloud computing

In Figure 1, mobile devices are connected to the mobile networks via base stations (e.g., base transceiver station, access point, or satellite) that establish and control the connections (air links) and functional interfaces between the networks and mobile devices. Mobile users' requests and information (e.g., ID and location) are transmitted to the central processors that are connected to servers providing mobile network services. Here, mobile network operators can provide services to mobile users as authentication, authorization, and accounting based on the home agent and subscribers' data stored in databases. After that, the subscribers' requests are delivered to a cloud through the Internet. In the cloud, cloud controllers process the requests to provide mobile users with the corresponding cloud services. These services are developed with the concepts of utility computing, virtualization, and service-oriented architecture (e.g., web, application, and database servers) [6].

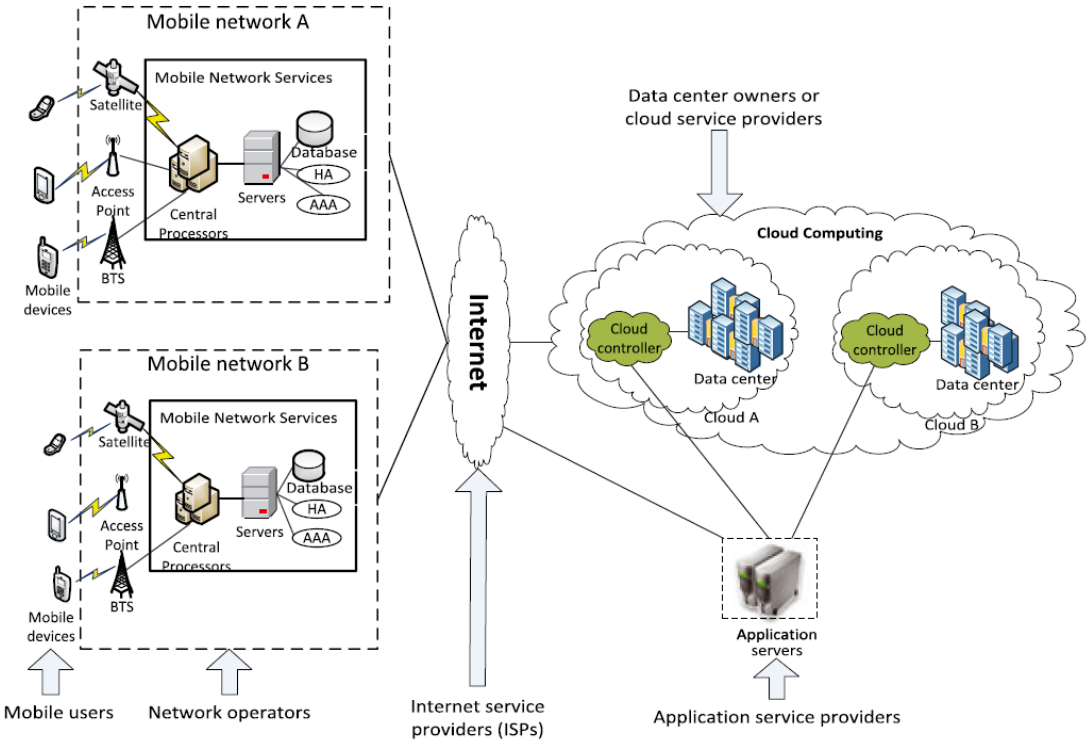

Fig. 1. Mobile cloud computing architecture [6].

Infrastructure as a Service (IaaS) enables the provision of storage, hardware, servers, and networking components. The client typically pays on a per-use basis. Thus, clients can save cost as the payment is only based on how much resource they really use. Infrastructure can be expanded or shrunk dynamically as needed. IaaS has the responsibility of the configuring the OS and middleware, software updates and licenses (in addition to PaaS). The examples of IaaS are Amazon Elastic Cloud Computing and Simple Storage Service (S3).

Platform as a Service (PaaS) offers an advanced integrated environment for building, testing, and deploying custom applications. PaaS has only responsibility for the application and the data the application uses. The examples of PaaS are Google App Engine, Microsoft Azure, and Amazon Map Reduce/Simple Storage Service.

Software as a Service (SaaS) supports a software distribution with specific requirements. In this layer, the users can access an application and information remotely via the Internet and pay only for that they use. Salesforce is one of the pioneers in providing this service model. Microsoft's Live Mesh also allows sharing files and folders across multiple devices simultaneously [6].

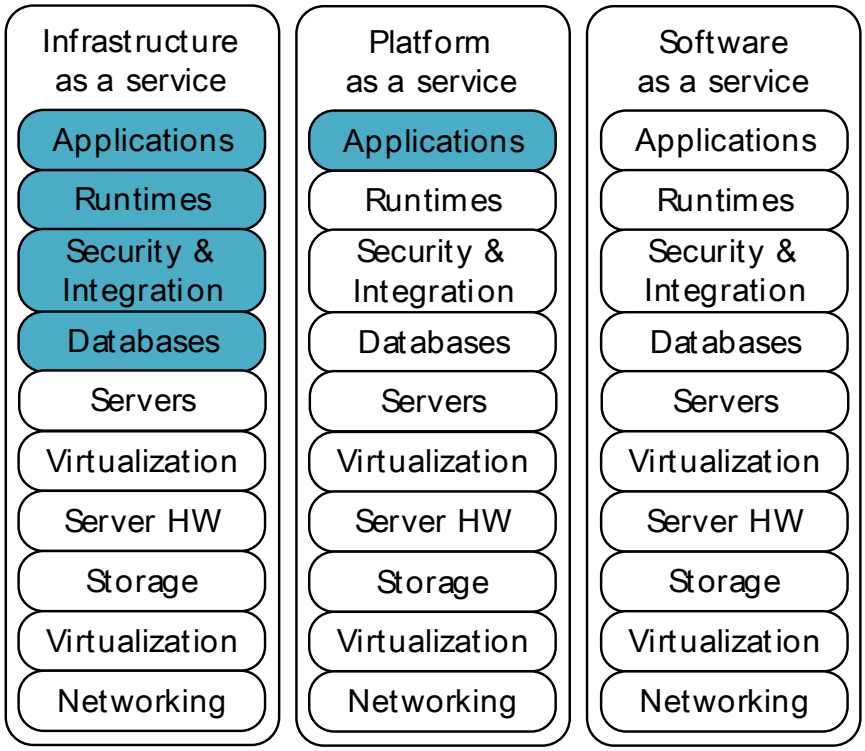

Fig. 2. Cloud computing architecture [7].

4. Cases of mobile cloud computing

Table 3 shows present condition of mobile cloud computing for each major company. Amazon started a new cloud service named Amazon Web Service (AWS) in 2002. AWS had been improved about for 10 years. In recent years, Amazon started another

service, Cloud Drive, for personal use. And they provided other services such as Cloud Drive Photo App and MP Cloud App to strengthen the Cloud Drive. Apple began MobileMe cloud service in July, 2008. The service provides synchronization for each device's data and contents. iCloud service was started, which was cloud storage service for individual users, in June, 2011. Google started Platform as a Service (PaaS) named Google App Engine in May, 2008. Google provided some services such as Google Drive (storage service), Google Docs (office software for Web), Google+ (social network service) in 2012. And they developed Chrome OS [8], which was almost a pure web thin client OS, in May, 2012. Microsoft released an online storage service, Windows Live Skydrive in February, 2008. And they released Azure, which was PaaS, in January, 2010. Now, Azure has been a representative cloud service for enterprise in the World.

Table 3. Present Condition of MCC (Global)

Corporation	Initial Stage	Current Stage
Amazon	Amazon Web Service (02)	Billing Alarm (12) Cloud Drive Photo App MP3 Cloud App
Google	Google App Engine (08) Google	Drive (12) Google Docs Google+ Chrome OS (12)
Apple	MobileMe (08)	iCloud (11)
Microsoft	Windows Live Sky drive (08)	Azure (10) Office 365 (11)

In Table 4, we could know about present condition of mobile cloud computing for each major company in South Korea. Naver is servicing N Drive for personal use. N Drive is a kind of cloud storage services. Naver has a plan to provide office software for Web. The software will be interlocked with N Drive service. Daum, SKT, KT and LGT also provide a cloud storage service.

Table 4. Present condition of MCC (in South Korea).

Corporation	Service Name	Storage	OS	User (K)
Naver	N Drive	30GB	Win, Mac	7500
Daum	Daum Cloud	50GB	Win, Mac, Linux	3000
SKT	T Bag Plus	10GB	Win	N/A
KT	U Cloud Home	50GB	Windows, Mac	700
LGT	U+Box	15GB	Windows	500

5. Conclusion

In this paper, we have surveyed for mobile cloud computing. Mobile cloud computing is mainly used for personal purpose. Therefore, SaaS will be more important to the users of mobile cloud service than IaaS or PaaS. The users will be able to enjoy a variety of applications and convenient environment for mobile cloud service with the improvement of SaaS. Also, a number of inexpensive hardware will be produced for web thin client (e.g., Chrome OS). Mobility will be improved and hardware will be simpler. This technology can be applied to miniature electronic devices such as wearable computer.

As smartphone users increase in the developing regions of Asia-Pacific, the Middle East, and Africa or mobile phone users are rapidly switching over to smartphones, the rate of dependence on mobile devices will increase. The market for mobile cloud application will also be expanded with the new demands. Future work includes the technical details and the new market trends for mobile cloud computing.

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