

# Discussion of Mobile Internet Service Development

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## Abstract:

With the enforcement of 3G network capabilities in the future, the mobile Internet will greatly change the service modes of traditional Internet, rather than simply combine the Internet with mobile networks. The development of new technologies such as Mashup and mobile widgets will enable better service for users and new business models, bringing benefits for the industrial chain members including operators, vendors, Content Providers/Service Providers (CPs/SPs) and Internet application providers. The mobile Internet and the traditional Internet not only compete for contents and services, but also cooperate with each other; and the mobile Internet services should focus on mobile applications to avoid the homogenization with traditional Internet service.

The deployment of commercial 3G networks and all-around fixed-mobile convergence announce the coming of mobile Internet era. Mobile Internet is an extension of Internet to mobile networks' value-added fields, using mobile communication networks as access networks. Combining advantages of 3G networks such as mobility and high bandwidth as well as mass contents and applications of traditional Internet, mobile Internet can meet the users' demands for large-capacity multimedia interaction anytime and anywhere, and greatly promote the development of information and communication market. In China, mobile Internet plays a significant role in enhancing the informatization level.

## 1 Development of Mobile Internet

The introduction of Internet technology in 20th century leads to a large number of Internet companies, represented by Google. Internet has changed people's work and life styles from all aspects. With the Internet, people can learn weather, current affairs and travel information at any time, read newspapers of the day and latest magazines, transact stocks

and go shopping without going out to the markets, send and receive emails, as well as enjoy distance medical treatment and education.

Globally, the development of Internet has experienced the following five stages:

(1) Early Internet is mainly made up of web portals, such as Yahoo!, providing network media and electronic media services.

(2) The growth of Internet websites makes quick search of Internet information increasingly important. As a result, search engines, such as Google and Baidu, receive explosive development.

(3) In the third stage, Instant Messaging (IM) and Video over Internet Protocol (VoIP) services develop rapidly due to low cost and instant communication. For example, QQ and Skype are widely accepted and applied by the users.

(4) With continuous development of Internet, the users are in strong demand to show themselves. Hence, User-Generated Content (UGC) (e.g. blog, community and video sharing) websites become the focus of Internet. A representative of such websites is Youtube.

(5) The emerging of Social Networking Service (SNS) websites (e.g. Facebook) leads Internet to social networks. Making use of users' social attributes, SNSs closely cling users to Internet by means of setting up social circles.

According to a statistical report released by China Internet Network Information Center (CNNIC), up to the end of 2008, China's Internet population hit 298 million, increasing by 41.9% compared with 2007, and its Internet penetration rate reached 22.6%<sup>[1]</sup>.

Characterized by mobility, mobile communications is gradually taking the place of traditional fixed communications. Meanwhile, Internet is now the most important carrier for information broadcasting. Therefore, mobile Internet, combining mobile communications and Internet, will be a development tendency of communications for a certain period in the future. With the increase of mobile communication bandwidth and intelligence of mobile terminals, it is feasible to use mobile terminals to access Internet in the environment which cannot be covered by fixed broadband networks. According to the latest data, in 2008, global mobile Internet users hit 546

million, which were almost two times over that in 2006; while in China, this figure reached 117.6 million, which doubled that of 2007.

## 2 Mobile Internet Services

According to a report of IResearch Consulting Group<sup>[2]</sup>, in 2008, among the Internet websites visited by Chinese mobile users, mobile.QQ.com, 3G.cn and mobile.sina.com.cn stood the first three, attracting 34.9%, 18.5% and 11.9% of the total users respectively. The large number of loyal QQ users transplant their traditional Internet access behaviors to mobile phones, founding a solid user basis for mobile.QQ.com. The website mobile.sina.com.cn provides diversified contents, enabling mobile users to quickly access updated news and information. 3G.cn offers a series of free services, proprietary client software and lots of communities to attract mobile users, which are also effective ways to retain the users.

With the enhancement of 3G networks in the future, mobile Internet is not simple addition of mobile networks and Internet. Owing to its special features, mobile communications will bring significant changes to traditional Internet service models in the following aspects:

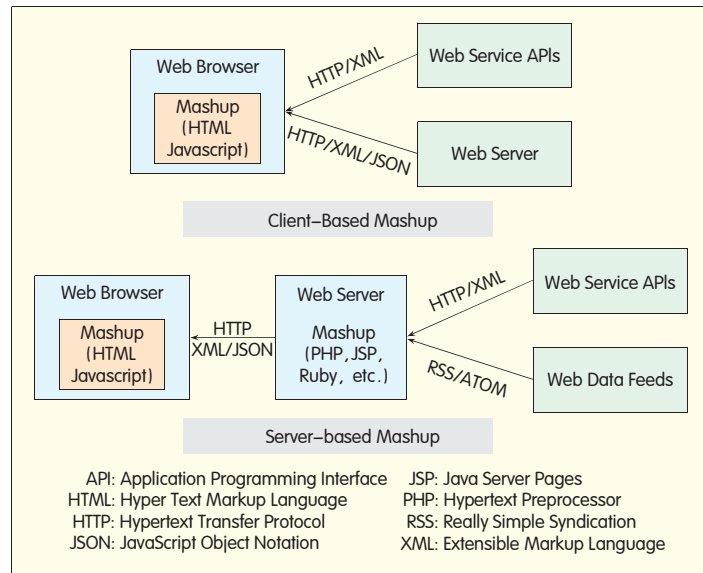
(1) The enhanced 3G networks ensure a consistent experience of mobile value-added services and Internet services in the fields of web portals, search engines, mails, videos, music, games and monitoring, which will be gradually integrated.

(2) The small sizes and poor processing capabilities of mobile terminals require traditional Internet contents and applications to be properly processed before they are presented onto mobile terminals.

(3) The mobile networks' knowledge of personal information, behaviors, online status and terminal capabilities of mobile users enables mobile Internet to deliver services that better satisfy users' individual demands. Besides, their capabilities of precisely positioning mobile terminals can promote the location-based mobile Internet services.

(4) The ubiquitous mobile Internet access can enhance the interactivity of value-added mobile Internet services,

Figure 1. ▶  
Function block  
diagram of Mashup.



carrying out the core tenet of Internet, i.e. participation and construction by all, as well as accelerating the development of mobile Web2.0 services, including blog, Really Simple Syndication (RSS), Wiki, SNS and IM.

## 3 Key Technologies of Mobile Internet

### 3.1 Mashup

With the popularization of Web2.0, interactive Internet applications, which are participated by the users, have won the favor of more and more users. Mashup<sup>[3]</sup> is a new application in Web2.0 era. The word Mashup comes from process music, defined as new songs consisting of parts of some popular songs. Similarly, Internet Mashup is a kind of content aggregation. It is an application model that combines data or functionality from multiple dispersed websites to create a new service. Therefore, it changes current situation where information is independent from each other.

Architecturally, Mashup is mainly made up of three functional parts: Application Programming Interface (API)/content provider, Mashup server and client's Web browser. Figure 1 illustrates the function block diagrams of client-/server-based Mashup.

#### (1) Client's Web browser

The Web browser presents the applications in the form of graphs and

the user can initiate mobile Internet interaction with the browser.

#### (2) API/content provider

API/content provider offers aggregated contents and applications. To facilitate the search, the providers often provide their contents in compliance with Web protocols (e.g. Representational State Transfer (REST), Web Service or RSS/ATOM).

#### (3) Mashup server

Mashup server dynamically aggregates contents and forwards them to the users. Moreover, the aggregated contents can be directly generated with scripts (e.g. JavaScript) on the client's browser.

Mobile network-based Mashup applications join telecom operators, equipment vendors, Internet application providers and value-added application providers. By constructing an ecosystem for mobile Mashup applications, these applications provide the users with better quality services, improve user experience, deliver new business models and solve the problem of mobile networks that applications are difficult to be enriched. Mashup not only offers more innovative aggregation applications to the users, but also brings benefits to all participants, including telecom operators, equipment vendors, Content/Service Providers (CPs/SPs) and Internet application providers.

### 3.2 Mobile Widgets

Widgets<sup>[4]</sup> is a small application that is

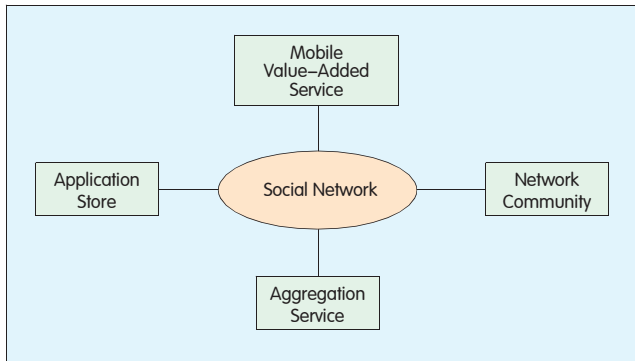


Figure 2.  
Services on social network platform.

implemented using web technologies including Extensible Markup Language (XML) and JavaScript. It can be divided into desktop Widgets and Web Widgets. With the development of mobile Internet and embedded devices, Widgets begins to be applied in handsets and other terminals. In addition, mobile Widgets and TV Widgets are derived.

Mobile Widgets is characterized by small size, light weight, low development cost, large number of potential developers, low coupling with operating systems and complete set of functions. Being run on mobile terminals, it has other features. First, mobile Widgets can easily create personalized user interface, which makes each handset unique. Second, mobile Widgets can deliver many applications for mobile scenarios, for instance, network applications related to environments or locations. Third, the specific services and contents of mobile Widgets enable the users to get useful information easier and reduce the traffic, avoiding extra traffic arisen from redundant data transmission. Finally, mobile Widgets is a good way for advertising on mobile phones. In sum, these features, that is, being easy to develop and deploy, personalization, interaction and small traffic, make mobile Widgets quite suitable for mobile Internet and an important part in mobile Internet construction.

Unlike PC, mobile devices' local capabilities have to be accessed via special APIs and they have to be more lightweight. Compared with PC, mobile devices and networks are more diversified, so the standardization for mobile Widgets is urgently needed. The technologies for mobile Widgets include Web2.0 technologies such as Ajax, HTML, XML and JavaScript, as well as

information technologies such as compression, digital signature and coding.

In the development and deployment of mobile Widgets, security issue has to be addressed, for example, how to guarantee the security of equipment, personal data or network data to avoid users being disturbed by unnecessary information.

## 4 Mobile Internet Service Operation

Nowadays, mobile Internet services are flourishing. As mobile networks and Internet compete and cooperate with each other in terms of contents and services, mobile Internet service innovation should take advantage of both success experience of Internet and features of mobile applications. In addition to diversification, mobile Internet services should stick to their own features, avoiding homogeneity with traditional Internet services.

### 4.1 Service Focus

Human beings tend to be social, and they often establish interpersonal relationship based on common values or hobbies. As the most interactive platform, social network has created many circles based on common values and it is advantaged to establish interpersonal relationship on a social network. The services of a social network are shown in Figure 2. SNS, which is based on Six Degrees of Separation theory<sup>[5]</sup>, has become the basis for establishing interpersonal relationship in the networks.

The operators always keep accurate and complete user information. By using existing user database and analyzing users' attributes and behaviors, the

operators can provide differentiated mobile Internet services according to users' recognition, contacts and experience. SNS websites can be used by the operators as start points to deploy mobile Internet. With mobile phones, PCs, server's Personal Information Manager (PIM) and users' call records, the operators can accurately learn the users' personal information as well as the information of their friends. So long the user's privacy is properly protected, the operators can use user information to expand their SNS services.

The applications delivered on a social network include:

#### (1) Mobile value-added services

Once SNSs are deployed, the operators can transplant their value-added mobile services, e.g. IM, mailbox and games, into mobile Internet.

#### (2) Network community

With the rapid development of community technologies and the popularization of community applications, Internet steps into an era of community. From applications such as Bulletin Board System (BBS), alumni, blog, personal space and friend-making to search engine, aggregation, marketing, business startup and investment on social network platforms, all have become focuses of the industry. According to a CNNIC report, the number of users of forums, BBSs, discussion groups and communities in China has already exceeded that of IM service, and they have become basic Internet applications next to emails. The operators should adapt themselves to the trend of Internet and develop SNS-centered, diversified community services with fixed-mobile convergence.

#### (3) Aggregation Services

Mashup technology is used to aggregate resources of Internet and mobile networks, providing more ubiquitous personalized services and solving the long-time bottleneck that contents are insufficient. Integrated with operation management capability and service support capability of mobile networks, aggregation services become operable, manageable and chargeable. They improve users' service experience as well as drive the development of open mobile Internet service models.

#### (4) Application shop

The application shop can attract third parties and users to develop applications, thus promoting sound development of personalized, long tail mobile Internet market. It conforms to the tendency of Web2.0, where users generate contents. Mobile Widgets is a good choice in deployment of application shops because it requires less on mobile terminals and developers, and has low dependence on underlying platform and powerful presentation capability.

#### 4.2 Operation Models

The competitive entities of mobile Internet market are complicated. Traditional Internet companies and terminal manufacturers have stepped into the field of mobile Internet. As network access service providers, the operators have a huge number of users. To avoid acting as only channels in the competition of mobile Internet, the operators should cooperate with other participants of the industry chain and lead mobile Internet toward sound development.

Under the guidance of cooperation strategy, operators such as NTT DoCoMo and SKT have taken a series of effective measures to cooperate with content providers and terminal

manufacturers regarding mobile Internet services. These measures have produced good results. These operators' data services have grown rapidly and their revenues have increased substantially. They are taking the lead in the development of global mobile Internet services. With the mobile Internet industry continuously developing, more user demands will be met.

### 5 Conclusions

The rapid development of mobile Internet draws much attention of global telecom operators, and they begin to set foot in data services of mobile Internet. The commercial use of 3G networks brings Chinese mobile Internet industry a new start and an opportunity of development. One common mission of all parties in the industry chain is to develop diverse innovative mobile Internet services and establish a sound ecosystem for mobile Internet based on the success experience of Internet.

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#### Biographies

##### Zhang Zhijiang



Zhang Zhijiang, PhD, is a senior engineer and the general manager of the Technical Department of China Unicom. His 10 patents have been granted domestically and internationally and 8 patents are still under granting. He has published 12 books, and 27 of his technical documents have been adopted by international standardization organizations.

##### Yan Binfeng



Yan Binfeng, PhD, is a senior engineer of the Technical Department of China Unicom. He has applied for 7 patents, published 1 book and over 10 papers. He has submitted more than 10 technical documents to such international standardization organizations as IETF, 3GPP2 and OMA.

## Roundup

### ZTE SDR Base Station Records over 200,000 Volume Shipment

ZTE Corporation (ZTE), a leading global provider of telecommunications equipment and network solutions, announced on November 13, 2009 that its Software Defined Radio (SDR) base stations have recorded a total volume shipment of over 200,000 units as of October 2009. It took the company almost one year to achieve the first 100,000 SDR units shipped by April 2009, and only six months to ship the second 100,000. The fast growth showcases global operators' recognition and favor of ZTE as a leading provider of SDR base stations, helping them meet the rapid market needs.

ZTE is the world's first equipment manufacturer to roll out its SDR base station platform, taking the lead in commercial deployment. With its SDR platform, ZTE's variety of multi-band and multi-standard wireless communications systems can be implemented with SDR technology, including GSM, UMTS, CDMA2000, TD-SCDMA, FDD LTE, WiMAX and

TDD LTE, all on the same hardware platform to realize co-existence and a smooth evolution between GSM/UMTS dual-mode, GSM/UMTS/LTE multi-mode and CDMA/LTE dual mode, thus reducing operators' TCO.

3G networks utilizing ZTE SDR base stations are being constructed across China, including a TD-SCDMA network (China Mobile), WCDMA network (China Unicom) and CDMA2000 network (China Telecom). In third party testing on China Unicom's WCDMA network conducted recently in 77 cities, ZTE's SDR solution achieved the highest ideal network ratio of 71.4% among the testing vendors.

In September this year, ZTE and CSL, the largest mobile operator in Hong Kong, jointly released an LTE commercial test network. Based on ZTE's SDR base station platform, CSL successfully built GSM/UMTS/HSPA+/LTE multi-mode networks with a maximum download rate of 127.552 Mbit/s and a mobile download rate of 43.9 Mbit/s. (ZTE Corporation)