Regulatory Prospect of the VoIP Service in Wireless/Mobile Environment

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ABSTRACT

When the Internet phone service, generally PC-to-Phone, first entered into the telecommunications service market, no regulatory issues were arisen to manage the service within the regulatory framework because of it's low quality, no phone number assignment and etc. However, almost the same quality, more applications and cheaper price compared with the fixed telecommunications service, have changed the regulator's policy allowing Internet phone service within market mechanism. While incumbent fixed telecommunications service enterprises had given with tremendous duties to continue the job categorized 'facilities-based telecommunication service provider', and which can be unreasonable and unfair if Internet phone service enterprises are allowed to enter into the fixed telecommunications market without any regulation. Thus, new regulatory framework has worked for the Internet phone service named the VoIP service generally in the fixed telecommunications market.

Recently, VoIP is provided not only in the fixed telecommunications market but also in the mobile market as Wi-Fi phone is feasible in the wireless LAN environment. Furthermore, bundled service of Wi-Fi and cellular phone service will be launched soon, and the next version will be the mobile VoIP service operating like a cellular phone service. Hence, we will meet similar situation when the VoIP service enters into the fixed telecommunications service market. And, in this paper, we prospect the regulatory issues arising when the wireless or mobile VoIP service enterprises enter the mobile market, by analyzing possible scenarios.

Key Words : Wireless VoIP, Mobile VoIP, Regulation, WiBro, WLAN

I. Introduction

The growth of the fixed line communications industry is currently undergoing something of a slowdown, in Korea as well as throughout the rest of the world. It is believed that KT, Korea's archetypal communications operator, has reached the limits of its growth in the fixed line telecommunication and high-speed Internet business areas. In particular, it has been forecast that the introduction of VoIP(Voice over Internet Protocol) will bring about the abrupt reduction of the fixed line market ultimately, the size of the VoIP market willcontract more rapidly than the already declining fixed line market.

Consequently, most fixed-line oriented operators are preparing for entry into the wire/wireless integrated communication service market - centered on VoIP in the mobile area - as a new growth driver. Currently, VoIP is being implemented in the fixed line environment as well as the wireless LAN environment, and the completion of the seamless handoff with the mobile communication service has enabled the realization of VoWLAN + cellular convergence service. Furthermore, WiBro technology in the remote LAN environment supports VoIP technology and is ready for commercialization.

Regulation concerning the VoIP service, which is adopted mainly for the fixed line environment, has entered a new phase as there is no problem in implementing VoIP in the wireless environment as described above. The wireless environment will differ from the fixed line environment in terms of the license

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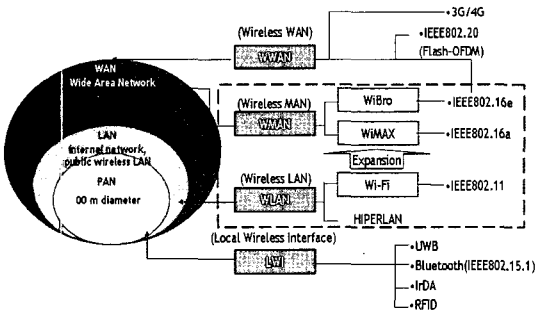
fee paid. Accordingly, this study attempts to examine the issues that are likely to arise when the VoIP service is expanded to the wireless area by analyzing possible scenarios, and proposes the best scenario in terms of market revitalization and the telecommunication service provider's competitiveness improvement.

Ⅱ. Technology and Market Trend

2.1 Technology trend

This study assumes that the wireless VoIP service will be implemented in WLAN environment, the mobile VoIP service is defined as "VoIP in the WMAN environment." The area inside the dashed line in Figure 1 is the target of this study.

Table 1 shows the time points at which wireless technology was or will be implemented by area. VoIP has already been implemented in Wi-Fi, and cellular & Wi-Fi convergence has reached the level of seamless handoff support. The portable Internet will be introduced in Korea for the first time in the world, while



* Source: Recompiled EnterKiner(2005)[1] and Kim, M.K.(2005)[2] data

Figure 1. Scope of Wireless/Mobile VoIP Application

Table 1. Handset Type and Implementation Time Point Related with Wireless/Mobile VoIP Network Technology

Network	Handset Type	Implementation
Wi-Fi	Wi-Fi alone: PC cards, portable	2004~2005
	Dual mode terminal (Cellular & Wi-Fi)	2005
WiMAX	PC cards, portable terminal	2007
Cellular EDGE or 3G	PC cards, portable terminal, communicating PDA	2005

* Source: IDATE(2005)[3]

the adoption of the mobile WiMAX is being accelerated worldwide.

2.2 Market Prospect

2.2.1 Wireless VoIP market prospect

TMRI(2005) forecast that VoWLAN-related equipment distribution will increase from 110,000 VoWLAN handsets (61.9 million dollars) and 800,000 access points (384 million dollars) in 2004 to 5 million VoWLAN handsets and 15.9 million access points in 2009[4].

In-Stat(2004) forecast that the number of VoWLAN/cellular combo subscribers will reach 256 million by 2009, which represents 12% of the total number of cellular subscribers[5].

2.2.2 Mobile VoIP market prospect

The new WiMAX version will support the mobile network. In-Stat(2005) forecast that the WiMAX service will secure 8.5 million subscribers (3% of the entire broadband market) by 2009 and more than half of the subscribers to WiMAX will subscribe to the VoIP bundled with WiMAX[6].

Furthermore, WiBro, which was developed in Korea, has been selected as one of the WiMAX standards. As such, Korea is expected to play a leading role in the mobile WiMAX market. Table 2 shows the number of WiBro service subscribers as forecast by SKT (2003), KT (2004), KISDI (2004), and ETRI (2004)[7]. The number of WiBro service subscribers is expected to increase from 0.14 ~ 1.31 million to 8.33 ~ 10.51 million in 2011. Accordingly, the number

Table 2. Forecasting the number of WiBro service and mobile VoIP service subscribers in Korea(unit: 10 thousand)

	WiBro subscriber*	Mobile VoIP subscriber**
2006	63	31
2007	258	129
2008	545	272
2009	764	382
2010	874	437
2011	922	461

* The average for the domestic forecasting data was applied. (It is assumed that the number of subscribers will not change once the VoIP service has been provided.)

** Assumed to be 50% of WiBro service subscribers, based on the In-Stat/MDR forecast.

of mobile VoIP service subscribers will increase from 70,000 ~ 660,000 in 2006 to 4.16 ~ 5.26 million in 2011, assuming that the number of mobile VoIP service subscribers will be half that of the WiBro subscribers.

2.3 Trend of wireless/mobile VoIP business in Korea

SK Telecom, Korea's first mobile operator, considered the strategy of combining other functions like the wireless LAN with the cellular in order to cope with KT's 'Onephone service'. However, when SK Telecom perceived that 'OnePhone service' had not been welcomed by the market, no specific measures were taken against it. Additionally, SK Telecom cannot carry out proactive marketing for wireless/mobile VoIP since it is deemed to encroach on the current market.

On the other hand, the KT group - equipped with both fixed and mobile communication service capability - has increased the number of hotspots where the wireless LAN service is provided, reaching some 17,000 spots in 2005. The foundations for wireless VoIP are being built up, with the number of KT 'Netspot service' subscribers surpassing 500,000 as of august 2005 and the number for 'Netspot Swing service' combined with the CDMA mobile phone exceeding 80,000. The wireless/mobile VoIP service at the KT Group level is considered from two viewpoints - it may encroach on the revenues of current mobile phone service or secure mobile competitiveness.

LG Telecom, the third mobile operator in Korea, is focusing on increasing the number of current service subscribers and the revenue per subscriber. Hence, LG Telecom is actively developing and providing a new service like mobile VoIP to compete with low price strategy.

Samsung Electronics, the leading handset manufacturer in Korea, has already developed the Wi-Fi handset and exported a large quantity of handsets (including 300,000 to Italy). Samsung Electronics is trying to seize the initiative in the world portable Internet business, and will provide its handset for an experimental portal Internet service for the 2006 Winter Olympic Games in Italy. Samsung Electronics has also been said to have developed a dual mode handset that combines cellular with wireless LAN.

The policy making agency in Korea saw VoIP as a target of regulation, and defined the regulation mainly from the perspective of the fixed line communication environment. On the other hand, the agency did not express any specific position with regards to the introduction of VoIP in the wireless environment. However, the agency is seriously reviewing the issue of market promotion and the principle of equity for incumbent mobile operators for when the wireless/mobile VoIP service is introduced.

Ⅲ. Current Regulations in Korea Relating to Wireless/Mobile VoIP

3.1 Service-related regulation

As described in Figure 2, telecommunication service providers in Korea can be classified into facilities-based telecommunication service providers, resale service providers, and value-added service providers.

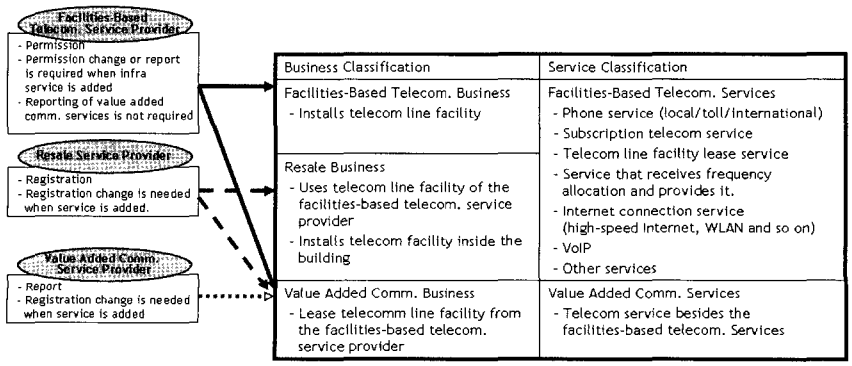


Figure 2. Classification of Telecommunication Service Providers and Services in Korea

Table 3. Services and regulation related with wireless/mobile VoIP in Korea

Service	Concept	Regulation
Fixed line phone	Local/Toll/International telecom service that sends or receives voice using telecom facility.	- Facilities-based telecom. service (phone service) - Universal service (local call)
IMT-2000	- Frequency usage: To provide mobile communication (IMT-2000) - Technology type: IMT-MC type (synchronous) or IMT-DS type (asynchronous)	- Facilities-based telecom. service (service that receives a spectrum allocation and provides it.) - Licensed spectrum (allocation with charge)
VoIP	Telecom service that sends or receives voice through Internet, regardless of the coverage area, using the telecom facility. (Voice communication between VoIP subscribers using PC is not included.)	- Facilities-based telecom. service (VoIP) - Sharing universal service loss - Builds up more than certain level of POI
WLAN	Telecom service that provides Internet connection, using telecom facility.	- Facilities-based telecom. service (Internet connection) - Unlicensed frequency
WiBro	- Concept: Service that provides high-speed wireless Internet connection on the move. - Frequency usage: To provide the WiBro (Portable Internet) service - Technology type: IEEE802.16-2004 IEEE 802.16e/Draft 3 or later version should be complied with.	- Facilities-based telecom. service (service that receives spectrum allocation and provides it.) - Licensed spectrum (allocation with charge)

VoIP is regulated as a facilities-based telecommunication service, and both facilities-based telecommunication service providers and resale service providers are allowed to provide the VoIP service.

Table 3 shows the concept and regulation of major services related with wireless/mobile VoIP.

3.2 Regulations concerning the converged service

Regulation of the converged service in Korea consists of that stipulated in the Fair Trade Law and that stipulated in Telecommunication Law.

The Fair Trade Law regulates 'tie-in sales[1)]', a similar concept to the converged service. It controls a tie-in sale of the market dominant service provider as anti-competitive behavior. Fair Trade Law article 2.3.2 (Prohibition of a market dominant position) stipulates that the market dominant service provider should not:1) provide the service at an unreasonable price 2) control the supply volume unfairly 3) hinder the business activity of other service providers; 4) interrupt participation of other service providers; and 5) gain customer subscriptions unfairly. In a recent case involving such activity SO took KT's high-speed Internet and satellite bundled service to the Fair Trade Committee. However, the Fair Trade Committee decided on April 2004 that service does not infringe the law, since the two products have no bearing on each other.

Telecommunication Law regulations, though pre-regulation in nature, have recently changed to post-regulation. Thus telecommunication service providers designated by the Minister of Information and Communication are controlled before entering into business so that the designated telecommunication service cannot be sold in a bundled format in the pre-regulation environment. Instead, the changed regulation stipulates that regulation is determined according to those effects that impede fair trade such as cost saving, increased user convenience, and transfer or

1) A "tie-in sale" involves forcing a trading partner to purchase the subsidiary product from a supplier or a service provider designated by the supplier when the supplier provides the primary product to the trading partner

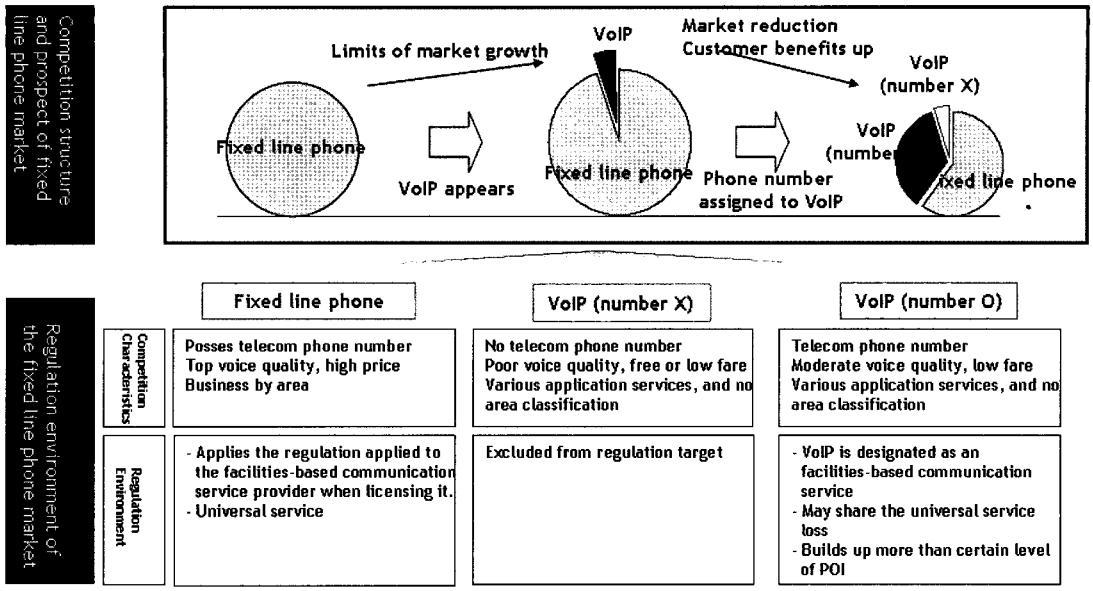


Figure 3. Competition structure and regulation environment change in fixed line phone market in Korea

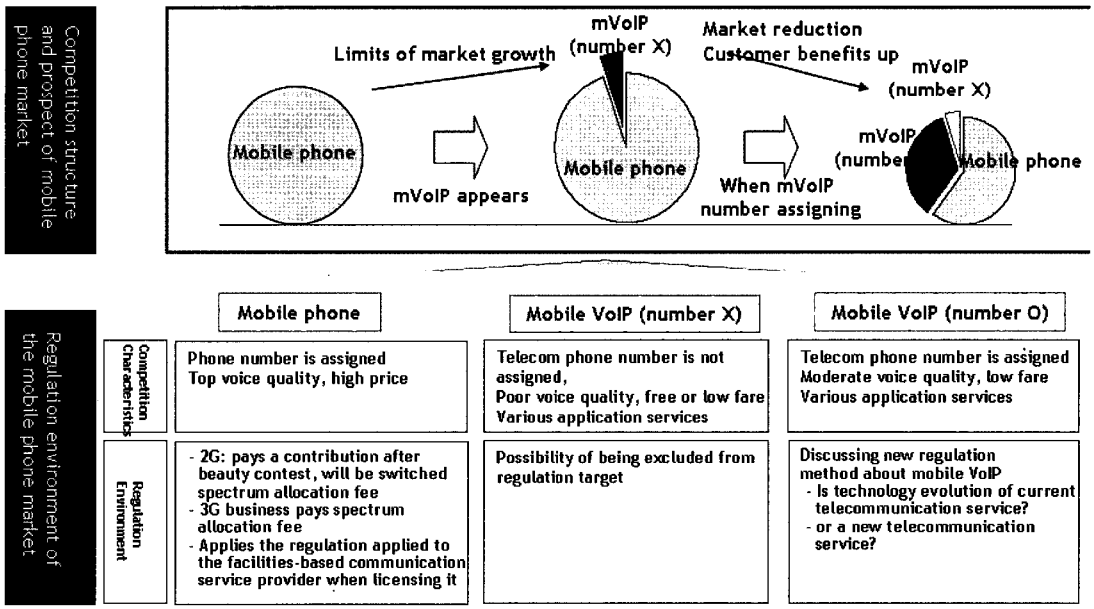


Figure 4. Competition structure and changes in the regulation environment in Korea's mobile phone market

market dominance due to tie-in sales.

Ⅳ. Regulation Scenarios of Wireless/Mobile VoIP Service

4.1 Change of market competition and regulation environment

As described in Figure 3, when VoIP service was first introduced into the fixed line phone market in Korea, it could not compete with the regular fixed line phone in terms of quality and phone number assignment, and VoIP service created a complementary goods market. However, quality improvement and number assignment make VoIP service a viable replacement for the fixed line phone, and the size of the entire market becomes smaller. Consequently, reg-

Table 4. Regulation scenarios of VoWLAN and VoWiBro

	Access to technology evolution or telecom. svc (no number assignment)	Access to technology evolution (number assignment)	Access to telecom. svc (number assignment)
Entry condition	-	In the case of WiBro, it may be possible recalculating the spectrum charges	Behavioral regulation type of the bundled service, but pre price authorization needed
Number assignment	-, (uses the mobile phone number)*	Probably new number for WLAN 010 possible for WiBro	070 possible for WLAN, WiBro 010 possible for WiBro
Revenue source	WLAN revenue WiBro revenue	WLAN revenue WiBro revenue	VoIP revenue
Quality assurance level	None	Specific quality regulation will be assigned according to the number	Same with the left

Note: * ( ) refers to the case of VoWLAN+Cellular or VoWiBro + Cellular

ulation that is applied to the fixed line phone also applies to the VoIP service.

On the other hand, as shown in Figure 4, VoIP service provided by the initial Wi-Fi cannot compete with the regular mobile phone market in terms of quality and phone number assignment, and creates a kind of complementary goods market, as in the fixed line phone market. However, it is forecast that VoIP will replace the current mobile phone as its quality is enhanced and a number is assigned. In particular, the mobile phone will be regulated differently from the fixed line phone, as the incumbent mobile operator pays for the allocation price of the voice service.

4.2 Regulation scenarios

As described in Table 4, VoIP in WLAN can be regarded as: 1) technology evolution, or 2) a telecommunication service. Additionally, each case can be viewed with or without number assignment.

VoWLAN without any number is strongly predicted as a non-regulated service such as PC-to-PC. But when the number is assigned to the service from the viewpoint of technology evolution, specific quality regulation will be imposed. In the case of the telecommunication service (VoIP service), pre price authorization and post regulation of the bundled service might be applicable, and the number 070, which is currently used by the VoIP service, can be possibly assigned.

Similarly, regulations for the mobile VoIP (VoWiBro) can be also viewed as: 1) technology evolution, or 2) a telecommunication service. The VoWiBro service will compete with mobile service as coverage extending and quality improving. In that case, '010' number may be assigned for preventing customers from being confused due to given mobile phone number. In addition, spectrum assignment charge is predicted to be recalculated from the viewpoint of the principle of equity.

In addition, the case of 'VoWLAN + Cellular'or 'VoWiBro + Cellular', there may be new competition environment, since a additional number does not need to be assigned if the mobile phone is linked with the customer's IP.

V. Conclusions

In terms of potential possibility to provide customers convergence services with reasonable communication fee and fixed - mobile convergence service providers with new business opportunity, it might be essential to launch convergence service (Wireless/ Mobile Internet + Wireless/Mobile VoIP). However, the result of adopting this convergence service is completely supposed to depend on the competitiveness of convergence service providers and the diffusion rate of the market.

From the viewpoint of technology evolution, the service providers can overcome the entrance constraint in order to launch it. In this case, it enables the fixed-mobile convergence service providers to offer their own flexible service. Moreover, it is strongly predicted for the Wireless/Mobile VoIP service providers to endeavor to increase service quality and to

invest in new technology, thus it also should cause relative market to be revitalized. In the case of defining the Wireless/Mobile VoIP as a kind of telecommunication service (VoIP service), it is likely that the Wireless/Mobile VoIP service providers to enter the service market without difficulty due to the post regulation, but actually it should regulated by the price authorization before entrance. Also, in this case, the Wireless/Mobile VoIP service providers would not have strong inducement to increase service quality and to introduce new technology, so that the market might not be activated due to lack of competitiveness for the existing similar service.

We can guess that the government allowed the mobile service providers to offer wireless Internet service in the past such as a technology evolution inducing the mobile service carrier to invest positively and cause the market to be invigorated. Thus, we can infer that defining the Wireless/Mobile VoIP as a technology evolution of WLAN or WiBro can cause relative market to be revitalized from the past experience. In addition, it is necessary to assign '010' number to the Wireless/Mobile VoIP service in order to increase service quality and decrease customers' confusion caused by several numbers.

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