

# A Comparative study on Countermeasures Leakage of Personal Information in new Mobile Phone Registration and Change in Korea

Il-kwon Lim, Eun So Mo

**Abstract : Background/Objectives:** If you cancel or change your mobile phone number in Korea, the existing number will be given to other new subscribers. As a result, the personal information of users of existing number is exposed.

**Methods/Statistical analysis:** As the smartphone convenience service becomes linked to the mobile phone number, the existing convenience service is notified or announced to the existing number even if the user changes, thereby disclosing the personal information of the existing user to the new user.

**Findings:** This is because the 010 number integration policy and personal information identification are used as mobile phone numbers. Accordingly, in order to prevent exposure of personal information, measures such as securing a new 010 number, strengthening the personal identification scheme in the service of the mobile phone convenience, and deleting the personal information of the associated service when changing the mobile phone number are necessary.

**Improvements/Applications:** If you resolve the cause of personal information disclosure, you will not be exposed to the personal information of existing users through the change and termination of mobile phone service number.

**Keywords:** Personal Information extrusion, smart phone, cell phone service, 010 Integration Number Policy, Smartphone convenience service, KakaoTalk

## I. INTRODUCTION

Mobile phone service is a service that is used by almost all users in Korea by spreading / promoting various new services and providing universal service. Accordingly, as of March 2018, the number of mobile phone users in Korea exceeded 64 million [1]. Figure 1 shows that smartphone subscribers have been growing rapidly since 2010, as the mobile phone service subscribers and smartphone subscribers are 2010 ~ 2016 released by Korea's Ministry of Science and Technology. In 2016, With 46 million subscribers, 75% of mobile phone users are using smartphones [2].

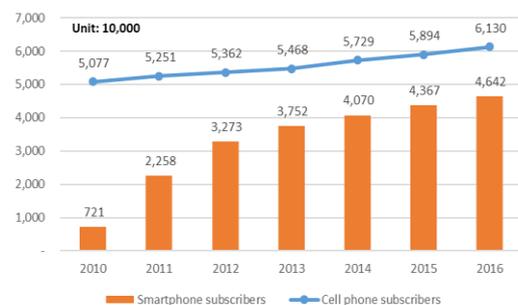


Figure 1. Mobile phone and smartphone subscribers

In this modern society, smart phones are widely used to say that they are indispensable, and services of life experiences such as smartphone messenger and delivery apps such as KakaoTalk are widely used by smart phones. Among them, KakaoTalk's monthly active users (MAUs) in the first quarter of 2017 are 44.23 million, which means that the majority of smartphone users are using KakaoTalk service in preparation for Korea's smartphone subscribers in 2016 [3]. If a smartphone user who uses a particular number terminates the mobile phone service or changes the number, the existing number is given to the user other than the user. The phone number given to another user may be exposed to others through existing services.

According to the Personal Information Protection Act of Korea, "personal information" is information (including those that cannot be identified by the information alone but can easily be identified and combined with other information) about a living person who can identify the individual through name, resident registration number, and image [4].

## II. PERSONAL INFORMATION DISCLOSURE CASE ANALYSIS

The following example is an example of personal information disclosure through a new phone number that the author is actually given after signing up for a new mobile phone. The newly assigned phone number is a phone number previously used by another user, and since it is a smartphone user, various services have been linked. Figure 1 below shows the notification of the service linked to KakaoTalk, and Figure 2 shows the exposure of the personal information learned through SMS (Short Message Service).

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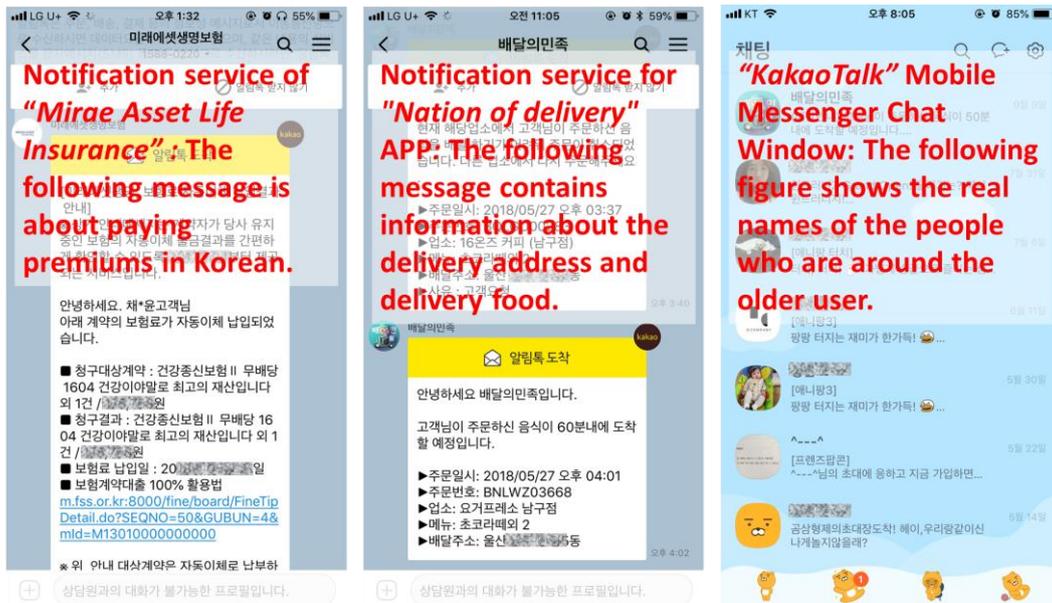


Figure 2. Examples of Personal information disclosure through KakaoTalk service

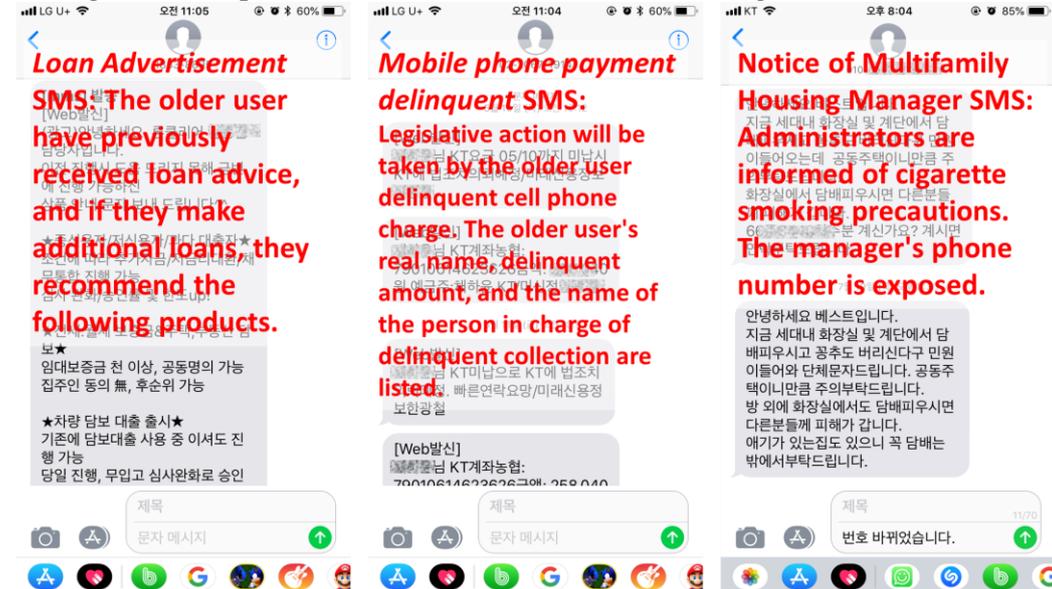


Figure 3. Examples of personal information disclosure through SMS notification service

Personal information of the previous user through the notification in Figure 1 and 2 is shown in Table 1 below. The personal information of the former user exposed is the name and address, financial status, insurance status, the name of the multi-family house in which the user lives.

Table 1. Exposed personal information

Division	Personal information
Name	Chae ** **
Address	S***** 5-dong, N**-gu, UI***, Korea
Debt status	Mobile phone unpaid charges, '*** **won', Consulting loan company called 'L***C***'
Insurance	Health insurance subscription and spending
Around acquaintance name	Kyung-****, Jeong **-Un, Lee ***-hoon, Jeong ***-Gyo, Go ***-Hyeon

※ Because it is actual personal information, it is not identified as \*.

### III. PERSONAL INFORMATION CONNECTION OF SMARTPHONE CONVENIENCE SERVICE

In the case of KakaoTalk service, a mobile messenger, the majority of Korean smartphone users are subscribed. This is not merely used as a mobile messenger, but provides services to users in connection with various services as shown in the following Table 2, and thus user subscription information and personal information are linked with each other [3, 4].



**Table 2. Main services based on KakaoTalk**

Classification	Service	Product Name
advertisement	Portal	DAUM pc portal, DAUM app mobile
	Messenger	Plus friends, PC version ads, Brand emoticons, Notify talks, Buddy talks, Chargers, kakao hair shop, Auto view, Order
	SNS	kakao Story
	shopping	kakao style
	video	kakao TV
contents	game	kakao Games, kakao Games
	music	Melon, kakao music
	Webtoon / Fiction	kakao Page, DAUM Webtoon
	emoticon	KakaoTalk, B2C emoticons
other	Commerce	Gift of Kakao Talk, kakao Friend, MAKERS with kakao, kakao Farmer
	Mobility	kakao Taxi, kakao Taxi Black, kakao Driver
	Pin Tech	kakao Page
	Other	Loen (music distribution outside)

Therefore, if the former smartphone user changes the number or terminates the existing service, the existing services do not disappear. Notifications and convenience services continue to be available through previously used numbers, so that users who have an old user number can get their old user's personal information. In addition to KakaoTalk, you can see that your personal information is exposed randomly through health insurance, delivery service application, SMS notification, etc.

### 3.2 010 Number Policy and Personal Identification Issues in Korea

The first of the many causes of personal information exposure by Korea's mobile phone-related policies is the depletion of the 010 start number. In accordance with the '010 Number Integration Policy' implemented by the Korean government, in February 2002, the 01X number of 2G service was decided to be 010, and from January 2004, the number of new 2G service subscribers began to be assigned 010 number. This was done to prevent identification of the identification number, to efficiently manage the communication number resource, and to improve the user's convenience [6, 7]. As shown in Table 3, 61.31 million (81.3%) of the total number of 77,392,000 subscribers to the mobile telecommunication service provider, as shown in Table 3, have been used for various initial numbers such as 011, 012, 017, 019, ) Are in use, and the remaining number is only 13.81 million (18.7%) [8-10].

**Table 3. 010 Number depletion due to number usage**

Telecom vendor in Korea	010 Starting number given by the government	010 starting number in use	Number of remaining numbers
SK Telecom	33.8 million	31.86 million (94.3%)	1.94 million (5.7%)
KT	24.56 million	18 million (73.3%)	6.56 million (26.7%)
LG U+	15.56 million	10.25 million (65.9%)	3.31 million (34.1%)
Sum total	73.92 million	60.110 million (81.3%)	13.81 million (18.7%)

However, due to technological advances and the lack of 010 numbers, explosion of smart devices other than mobile phones, use of more than 2 numbers per person, and the development of 5G mobile communication and IoT technology, if there are a large number of mobile phone service free phone numbers, a new number will be given to another person when the mobile phone service is terminated or changed. However, in the current situation, the existing number cannot be assigned to the new subscriber. Personal information can be acquired.

The second cause is the use of mobile phone numbers for user identification and authentication. If individuals are identified and used by mobile phone number without using personal authentication technology such as public certificate or biometric authentication, personal identification will use existing mobile phone number even if mobile phone number is changed. Therefore, to a smartphone recognized as an existing mobile phone number or mobile phone number. Banks, and archives, and does not pay much attention to security for simple lifestyle services.

The third reason is the lack of connection between existing smartphone convenience service and system change/termination of mobile phone call. In case of sharing information of new subscription/deletion/modification in connection with system, if there is a change of mobile phone number, it can be changed to related organizations and companies. However, a provider of smartphone convenience service may be a private company, a small business, since it is often the case that services are provided, it seems difficult to connect systems.

## IV. COUNTERMEASURES

If we solve the cause of personal information exposure, it will disappear. Nationally, a system and system are required to delete the personal information of all convenient services associated with the existing mobile phone number when changing / changing the number through the relevant laws and regulations on smartphone convenience



service when changing the number. It may be possible to support the development of linkage information deletion systems according to the public convenience in the country.

And the 010 number is an improvement of integration policy. Currently, as the number of mobile phone service user increases, the 010 starting number in use is exhausted and the old number is assigned to the new subscriber. In order to solve this problem, it is not to re-grant / re-use the existing number by securing 010 mobile phone number addition. To do this, it seems necessary to overhaul the 010 numbering system, such as increasing the number of existing 11 digits to 12 to 14 digits or more, or considering starting numbers other than the 010 starting number.

For convenience service vendors, the solution is as follows. When you join a convenience service platform using a smart phone, you automatically subscribe to a number of services that are linked. This is likely to be solved if the service is deleted or new subscriber authentication is performed automatically when the application is deleted due to the change or termination of the mobile phone service. Also, you should not use only your mobile phone number when you identify yourself. This should be done in the same way as national policy.

For individual users, it is necessary to delete notices and personal information of related convenience services at the time of number change and termination, and to use the number portability system without using the number portability system if it is not necessary to change the number. The following table 4 summarizes the cause and countermeasures of personal information disclosure.

**Table 4. Causes of personal information disclosure and countermeasures**

<i>Cause of personal information exposure</i>	<i>Countermeasures</i>
010 Shortage of available numbers due to numbering system	<ul style="list-style-type: none"> <li>• 010 Securing available resources for mobile phone service through information system reorganization</li> </ul>
Use mobile phone number as personal identification system for Smartphone convenience services	<ul style="list-style-type: none"> <li>• Obtain laws and regulations prohibiting the use of mobile phone number personal identification systems</li> </ul>
Inadequate system connection of mobile phone number change/termination related services	<ul style="list-style-type: none"> <li>• Mandatory system linkage with improvement of related laws and system.</li> <li>• Or government's public-link system support</li> </ul>
Auto subscription of smartphone convenience service platform	<ul style="list-style-type: none"> <li>• Delete personal information in case of application deletion</li> <li>• Re-install, reconnect user authentication again</li> </ul>
Lack of user attention	<ul style="list-style-type: none"> <li>• Termination of related service when using number change/termination or utilization of number portability system</li> </ul>

**V. CONCLUSION**

In this paper, we investigate the actual cases of personal information disclosure situation when changing the number and termination when using mobile phone service, and investigated the causes and countermeasures accordingly. Since the enforcement of the Personal Information Protection Act for the first time in 2011, Korea has strongly regulated the collection and distribution of information related to personal information, and has implemented laws, systems and services accordingly. However, as described above, the personal information of the other person is easily exposed only by acquiring the number of the existing user due to the change or termination of the mobile phone service, and another problem may arise. There seems to be urgent need to change laws and institutions, and technological research is needed to cope with such exposures.

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