

Terminating 2G Service in Korea: Policy Issues and Suggestions

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ABSTRACT

KT, one of Korea's mobile network operators, terminated 2G service completely as of March 19, 2012. In this paper we explore diverse issues associated with this service termination, including conflicting interests observed in legal disputes. We then propose policy suggestions to facilitate mobile network operators' smooth transition to advanced mobile communications services while protecting subscriber benefits. As other mobile network operators in Korea and worldwide are, or will soon be, facing similar issues, this study should serve as a useful reference for mobile network operators and telecommunication regulators.

Key words: Termination; 2G; Mobile communication; Compensations; Holdout; Korea

※ First received, October 20, 2013; Revision received, December 6, 2013; Accepted, March 10, 2014.

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I. INTRODUCTION

3G mobile communications service is now the dominant mode of mobile communications, and 4G service (Long Term Evolution: LTE) has been launched in many advanced countries. As this transition becomes increasingly more widespread, mobile network operators (MNOs) worldwide are already facing, or will soon face, the issue of terminating 2G service.¹ MNOs are considering shutting down 2G service because to do so brings several benefits: saving the costs of operating 2G service network for a small number of remaining subscribers, releasing spectrum for 3G or 4G services that have been in need of capacity for fast growing data communications, and reducing complexity in simultaneously operating 2G, 3G, and 4G service networks.

Shutting down 2G service, however, also raises issues that MNOs and telecommunication regulators must address efficiently. MNOs need to make decisions on when to start the termination process, whether to implement forced termination, and how to construct compensation packages for voluntary and/or forced termination. MNOs would also want to induce existing subscribers to quit 2G service subscription voluntarily but at some point might have to terminate service provision without subscribers' consents. By offering compensation packages, MNOs may induce existing subscribers to migrate to their own advanced services or to other MNOs' services. In addition, in proposing compensation packages to existing subscribers, MNOs need to take into account possible strategic behaviors of subscribers to hold out on migration with the expectation of a bigger compensation package.

On the other hand, the regulator should balance subscriber protection and smooth development of mobile communications services. Regulators may assume leadership in the closing process or simply let MNOs handle the issues themselves. Telecommunication regulators in general have the authority to allow service termination for MNOs because MNOs provide public communications service using the spectrum, often considered a public asset (Hazlett, 2008; Kwon, 2008; Kwon, Lee, & Oh, 2010). Of course, even in the case where MNOs need to obtain

¹ Softbank Mobile Corp., a Japanese MNO, terminated 2G cellular service on March 31, 2010, and AT&T recently announced the deadline for 2G network shut-down (Goldstein, 2012). Refer to http://mb.softbank.jp/en/customer_support/2G_end/service_end.html.

the regulator's permission for shutting down 2G services, the degree to which the regulator can get involved varies across countries, depending on specific legal environments.

KT, one of Korea's MNOs, completed shutting down 2G services on March 19, 2012, but the process was an arduous mixture of resistance and even lawsuits by subscribers. The process lingered on for about nine months from the date that KT initially planned to shut down and revealed policy issues that would have been unnoticed otherwise.

The objectives of this paper are to explore major policy and legal issues with regard to 2G service termination, review conflicting interests observed in legal disputes, and propose policy suggestions for telecommunication regulators to facilitate MNOs' smooth transition to advanced mobile communications services while protecting subscriber benefits. Other MNOs in Korea and worldwide are, or will be, facing the same issues sooner or later, and therefore this study should serve as a useful reference for MNOs and telecommunication regulators in preparing 2G service termination.

Major findings of this paper are as follows. First, it is better for the regulator to remain involved in the termination process than to take a *laissez-faire* approach as active involvement may reduce negotiation costs between MNOs and subscribers, while minimizing uncertainties and holdout possibilities. In addition, the general public's interest in such matters as the efficient use of scarce spectrum resources or the smooth technology development might be ignored without regulators' involvement. Second, the regulator need to set a standardized termination process, especially with respect to establishing the rules for minimum preparation time and the criteria for forced termination. Such regulations will improve the transparency of the process and reduce opportunistic behaviors by MNOs and subscribers. Third, even though property rights for phone number are often not acknowledged, subscribers have some limited rights based on subscription contracts. Therefore, in cases of forced termination, 'just' compensation should be provided to remaining subscribers. We will discuss whether KT's compensation package was actually set in accordance with the standard legal practice for damage compensations.

The structure of this paper is as follows. The next section briefly overviews the developments of mobile communications market in Korea over the past decade. This section aims at introducing mobile market evolution in Korea in order to help readers understand Korea's mobile communications market situation. Section 3

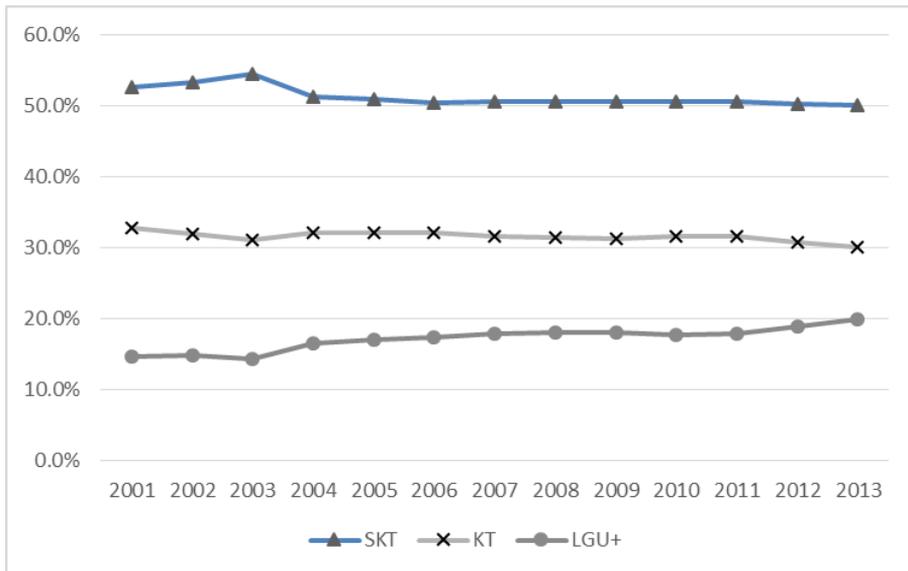
explores KT's 2G service termination process, enumerates the issues that were exposed through the shutting down process, and identifies conflicting values that should be balanced. Section 4 reviews three legal and economic issues raised in class action lawsuits: subscribers' rights to keep their phone numbers, holdout possibilities, and determination of a fair level of compensation for subscribers. Section 5 concludes the paper with policy suggestions.

II. EVOLUTION OF MOBILE COMMUNICATIONS MARKET IN KOREA

1. Market structure and competition among players

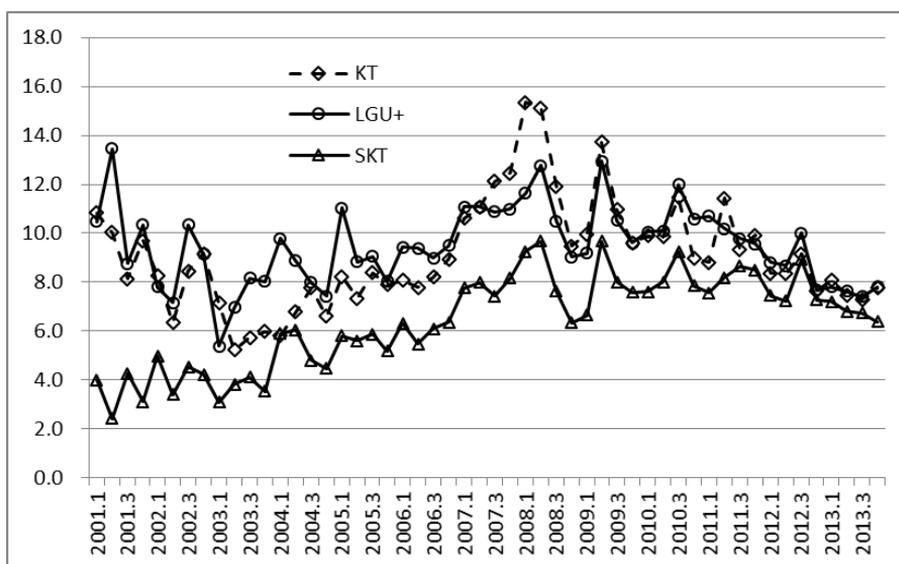
The Korean mobile communication market has grown to a saturation point during the last decade. The mobile subscription rate, which was 57.0% at the end of 2000, exceeded 100% in the first quarter of 2010 and reached 108.9% at the end of 2013.

<Figure 1> Subscriber market shares of the three MNOs in Korea



While the mobile communication market has been growing to saturation in Korea, the market shares of three MNOs have remained stable, as shown in Figure 1, for the past ten years or so even though there were two major events that could have possibly disrupted stability in Korean mobile market: 3G service was launched in 2007 and smart phones began to be sold in 2009. SK Telecom (hereinafter SKT) has been the dominant player in the Korean mobile communication market, maintaining a market share slightly higher than 50%. The remaining 50% is shared by KT and LGU+ (about 30% and 19% respectively).

<Figure 2> Subscriber deactivation rates in Korea



Even though it may appear as though the stable market share over the past decade is a reflection of the peaceful relationship maintained by the three MNOs, competition in the Korean mobile communication market has been fierce, as can be easily seen in the changing customer deactivation rates (See Figure 2). Figure 2 illustrates the growing intensity of competition among the three MNOs. First, even though the deactivation rates of SKT mimic similar patterns to those of other MNOs, they have been consistently lower for the past decade or so.² This consistent

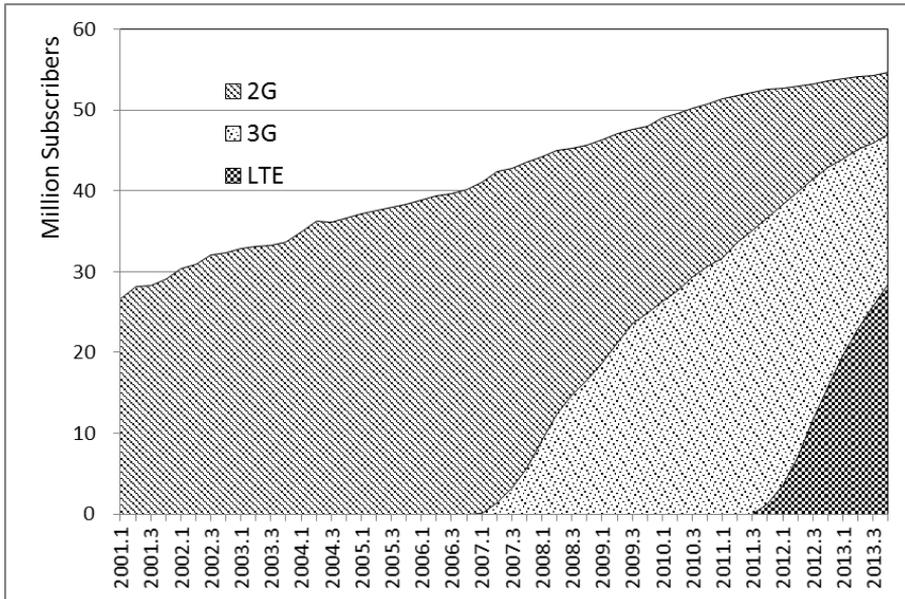
² Deactivation rates are used instead of customer churn rates. Two concepts are the same.

disparity in deactivation rates seems to confirm a common perception that SKT has had relatively loyal customers. Second, deactivation rates jumped after 3G service was offered in Korea in early 2007, and adoption of the new service triggered marketing competition in the Korean mobile market. Marketing expenditure of SKT was actually increased from 20.5% of total revenue to 25.2% between 2006 and 2007.

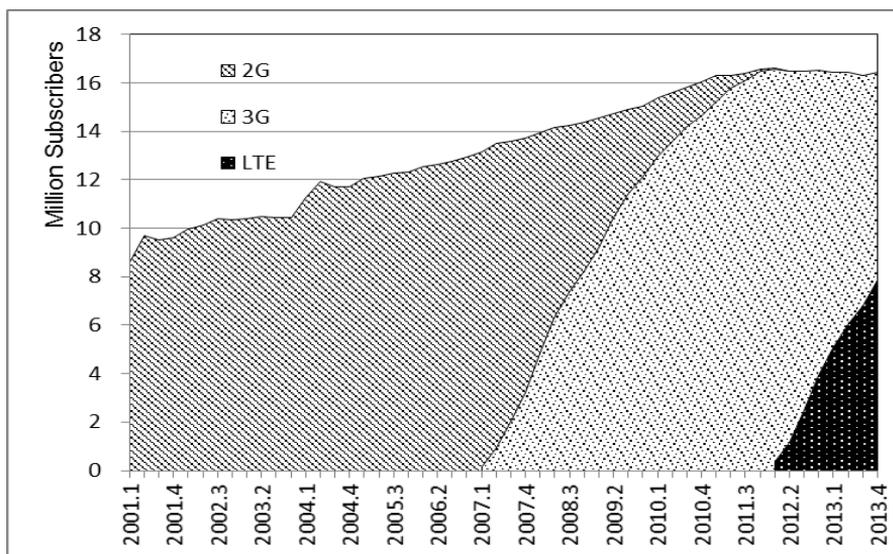
2. Service evolution in the Korean mobile market

Mobile communication service has been evolving from 2G service, which is voice service oriented, to 3G, voice and data service oriented, and to 4G, data service oriented for the past seven years. Before 2G service termination, 4G service, a data communication service based on Long Term Evolution (LTE) technology, was also launched in many countries including Korea. Verizon Wireless, for instance first launched LTE based 4G service on a large scale in 2010, and, in Korea, LGU+ first launched LTE service in 2011. This means that in many countries three generations of mobile communication service are being offered at the same time.

<Figure 3> Evolution of mobile services (in terms of subscribers) in Korea



<Figure 4> KT subscribers: changes in subscriber mix



As shown in Figure 3, 4G is currently the dominant mode of mobile communication service in Korea. 3G service was launched in Korea in early 2007 and overtook 2G service in terms of subscribers at the end of 2009. Then, at the end of second quarter of 2013, the number of LTE subscribers surpassed that of 3G service subscribers. Both SKT and LGU+ launched LTE in 2011, but KT had to delay its launch for several months because its spectrum for LTE was locked up due to the unexpected delays in the 2G service termination process. Figure 4 illustrates changes in KT's subscriber mix over the last decade.

LGU+ and SKT did not face a spectrum deficiency, but they still have about 3.8 and 3.9 million of 2G service subscribers respectively as of the end of 2013. Therefore, it will not be long before these two MNOs also confront 2G service termination issues.

III. TERMINATION PROCESS OF KT'S 2G SERVICE AND EXPOSED ISSUES

The shutting down process of KT's 2G network can be divided into two phases:

during phase 1, permission was obtained from the Korea Communications Commission (KCC) and, during phase 2, termination was implemented, subsequent to receiving the permission.³ The following two subsections explore these two phases, and the third subsection summarizes the issues that arose during this process.

1. Phase 1: Obtaining permission from the KCC

According to the Telecommunications Business Act of Korea (§19), MNOs must acquire permission from the Ministry of Science, ICT and Future Planning (MSIP) now, but before March 2013 from the Korea Communications Commission (KCC), for service termination and should notify subscribers at least 60 days prior to the intended termination date. In addition, the Presidential Decree of the Telecommunications Business Act (§24) enumerates the documents that MNOs have to submit to obtain the MSIP's permission at least 60 days prior to the intended date for termination. However, the details of the approval process are specified neither in the Act nor in the Presidential Decree. The actual termination process was put in place only after the KCC gave the final approval, but there is no guarantee that the same procedure will apply in the future. Figure 5 presents the approval procedure for service termination explained in the KCC's press release (2011b).

<Figure 5> Telecommunications service termination process in Korea



According to the release, the official process begins with an MNO's submission of a termination plan to the MSIP (the KCC in the past). After reviewing the plan, the MSIP may accept the plan or ask for revision. If the MSIP accepts the plan, an MNO can take steps to terminate the service, while soliciting remaining subscribers to transfer to its advanced services or other MNOs' 2G service or advanced services.

³ From March 2013, the authority to regulate the telecommunications industry was transferred from the KCC to the Ministry of Science, ICT and Future Planning in Korea.

After at least two months have passed since the plan is accepted, the MNO can request permission for service termination from the MSIP. When permission is granted, the MNO can finally terminate the service following the conditions specified in an MNO's existing subscription contracts.

On March 28, 2011, KT, following the Act and the Presidential Decree, first notified its 2G service subscribers of its intention to terminate 2G services as of the end of June 2011. It then filed, on April 18, 2011, a petition for the KCC's permission to terminate its 2G service (KCC 2011a). The KCC, after reviewing KT's plan through its special advisory board, decided on June 24, 2011 to postpone (without rejecting) granting its permission for KT's 2G service termination on two grounds, even though it clearly recognized the necessity for spectrum release for LTE (KCC 2011a).

The first reason for denying permission was that there were too many remaining 2G subscribers of KT. As of the end of May 2011, the number of KT's 2G service subscribers was about 810,000, which was about 5% of KT's total mobile subscribers (KCC, 2011a). The KCC referred to the fact that when Softbank Mobil Corporation had terminated 2G services, the remaining 2G subscribers had been only 2.45% of the total (KCC, 2011c). NTT Docomo, the largest MNO in Japan, which terminated 2G services at the end of March 2012, had reduced the number of 2G subscribers to 202,000, only about 0.3% of its total mobile subscribers, at the end of 2011 (NTT Docomo, 2012). The KCC, however, did not address just how much smaller the number of remaining subscribers should become for KT to terminate its 2G service.

The second reason for denying permission was that the period of notice to subscribers was too short. The KCC pointed out that three months was too short a period for remaining subscribers to transfer to other services although KT fulfilled the requirements of the Act. In making its judgment on the appropriate notice period to subscribers, the KCC referenced the case of SKT, which had publicized its termination policy of analog cellular system for nine months before its termination in 1999 (KCC, 2011c). Japanese MNOs set a much longer lead time for 2G service termination than KT did. Softbank (2008) announced its intention to discontinue 2G services on July 3, 2008, which was about 21 months earlier than the scheduled termination date, March 31, 2010. Similarly, NTT Docomo (2009) also publicized its 2G service termination policy on January 20, 2009, which was 38 months earlier than the scheduled termination date of March 31, 2012. Even though

the KCC's judgment appears reasonable, this case raises the policy issue of whether it is better for the government to set a specific period of notice to subscribers and, if so, what the appropriate length of lead time should be.

After about a month had passed since its failure to obtain permission, KT filed again for approval on July 25, 2011, after changing the intended termination date to September 30, 2011 (KCC, 2011b). Before filing the petition, KT had reduced the number of remaining 2G service subscribers to almost half the May 2011 number.⁴ The KCC, however, delayed its official reception of the petition this time until September 19, at which point KT had to revise termination date again. On November 21, 2011, when more than two months had passed since the KCC's reception of the petition, KT requested permission for service termination, which was granted two days later with three conditions attached (KCC, 2011c).⁵ Table 1 summarizes the policy variables that the KCC stated it had considered in granting permission for 2G service termination (KCC, 2011c).

The KCC postponed its official reception of the plan until the remaining 2G service subscribers dwindled to less than 1% of total mobile subscribers of KT, which occurred about nine months after KT's initial announcement of the plan (KCC, 2011c). Considering that KT could not launch LTE service because of the delay, while other competing MNOs had already started LTE service in October 2011, it is clear that KCC's delays in granting permission exerted great pressure on KT to aggressively solicit remaining 2G subscribers to migrate to other services. When KT requested permission for termination on November 21, 2011, the number of remaining 2G service subscribers was 159,000, 0.96% of KT's total mobile subscribers.

⁴ As of July 20, 2011, the remaining subscribers were about 420,000 (KCC, 2011b).

⁵ The first condition was that KT could terminate 2G service after 14 days had passed from the date when permission was granted, and, upon receiving permission, KT was required to inform remaining subscribers of the service and area that would be terminated through at least two notification methods, including postal notification. The second condition required that KT do its best to minimize inconveniences of migrating subscribers while terminating 2G service, and the third was that upon completing the termination process, KT was required to report to the KCC the completion of termination and the outcome of subscriber protection measures implemented (KCC, 2011c).

<Table 1> Major concerns of the KCC in granting permission for KT's 2G service termination

Policy variables	KCC's Judgments
Remaining subscriber numbers and composition	<ul style="list-style-type: none"> - The number of subscribers had decreased to 159,000, 0.96% of total mobile subscribers of KT when the KCC granted permission. - Among 159,000 subscribers, 146,000 subscribers were voice service oriented users and the rest data service users.
KT's efforts to boost subscriber migration	<ul style="list-style-type: none"> - To spur subscriber migration, KT publicized 2G service termination plan many times in newspapers, informed subscribers of termination over the phone, and visited subscribers in person, especially old and disabled subscribers.
Domestic and foreign precedents	<ul style="list-style-type: none"> - SKT set 9 months lead time before transition to digital cellular service. - When Softbank terminated 2G service, the remaining subscribers were 2.45% of the total mobile subscribers.
Availability of alternative services to 2G subscribers	<ul style="list-style-type: none"> - KT's 2G subscribers could migrate to 2G services of SKT and LGU+ or 3G services. Therefore, KT's termination of 2G services was not likely to harm significantly the subscriber interests and welfare.
Technology development trend in mobile markets	<ul style="list-style-type: none"> - Considering the dynamically developing mobile communication technology and competition in the Korean mobile market, the KCC acknowledged the necessity for KT to launch LTE service.

<Table 2> Subscriber protection and compensation packages

	KT 2G to KT 3G	KT 2G to SKT or LGU+
Subscription fee	Exemption of 3G subscription fee (24,000 Korea won)	Refund of 2G subscription fee (30,000 won)
Device	34 kinds of free devices are available for subscribers	33,000 won is paid for a returned 2G device
Cancellation fee and remaining installment	Waived	Waived
Rate discount	6,600 won per month for 24 months	-
Other benefits	Succession of points, mileage, and discount for long-term users	Commuting fee of 10,000 won is given.
	Free call transfer service when number is changed.	

* Exchange rate on November 23, 2011 was 1,151 won per dollar.

2. Phase 2: Terminating 2G service

Table 2 shows the subscriber protection and compensation plan KT implemented to get the KCC's permission. When a 2G subscriber migrated to KT's 3G service, the

subscription fee was waived, a free device was provided, and the monthly access fee was discounted by 6,600 won per month. If a 2G subscriber migrated to other MNOs, the 2G subscription fee of 33,000 won, paid at the time of subscription by the subscriber, was refunded when the subscriber returned the 2G device to KT and the commuting fee of 10,000 won was also provided to subscribers.

After receiving permission from the KCC, KT planned to terminate 2G service on December 8, 2011. However, about 900 subscribers filed a class action suit against the KCC and KT, requesting a preliminary injunction to stop the process, and the Seoul Administrative Court ruled on December 7, 2011, that KT should not terminate 2G service until a judgment on the merits of the case was made. The court noted that KCC's permission for 2G service termination could have violated the Telecommunications Business Act, and it could result in unrecoverable damages to the remaining 2G subscribers. The KCC and KT immediately appealed, and the Seoul High Court overturned the lower court's decision on December 26, 2012, allowing KT to begin the 2G service phase-out on January 3, 2012, and finish it on March 19, 2012. The High Court's reversal was based mainly on two reasons: one was that damages for forced termination could be financially compensated, and the other was that KT's delayed entry into LTE service might harm consumer welfare by reducing competition in the LTE service market. The court also ruled that forced 2G service termination by KT does not generate unrecoverable damages to remaining subscribers. Those who had filed the class action suit re-appealed to the Supreme Court, but, ultimately, the Supreme Court affirmed the High Court's decision on February 1, 2012 and KT was able to shut down its 2G network completely by March 19, 2012.

3. Policy issues exposed

An MNO (KT), subscribers, and the regulator (MSIP now and KCC in the past) were key stakeholders in KT's 2G service termination process. By closing down 2G services quickly, KT wanted to secure the spectrum for LTE service and reduce the costs of managing three mobile networks, whereas the remaining 2G service subscribers complained about inconveniences of migration and loss of their old cellphone prefixes, i.e., their current phone numbers.⁶ The KCC needed to balance these conflicting interests while also taking into account public interests, such as

⁶ We will discuss in section 4 whether subscribers have a legal right to maintain their numbers.

technology development and market competition. Despite the KCC's efforts, the termination process, as explored in the previous subsections, did not proceed smoothly and revealed several policy issues that telecommunications regulators should address in the future as next discussed.

With regard to the termination of the old service, regulators may or may not control the termination process and, if they choose to do so, they should determine the degree of their involvement. Firstly, regulators need to determine whether they should be involved in the termination process or let the market handle the process. The Coase theorem may be invoked to answer this question (Coase, 1960). According to the theorem, if the negotiation cost among parties is relatively low, the government's involvement is not necessary, and the market negotiations will result in the optimal outcome. If the termination of 2G service is purely a private matter between KT and subscribers, regulators should therefore opt for this *laissez-faire* approach. However, a delayed termination process can create negative externalities for the general public because the 2G service spectrum, a valuable public asset, will be underutilized, technology development might be weakened, and competition in the advanced service market could be harmed. This means that the concerned parties in KT's case are not just KT and the remaining subscribers, but include the general public. The negotiation among the parties concerned would then be virtually impossible simply because coordination of their interests is too difficult. A market solution might not be found in such a case and, even if it were to be found, it would not be optimal. Therefore, regulators' active involvement in the termination process could be justified. In addition, some of the remaining subscribers might have a strategic incentive to draw out the termination process in order to obtain more benefits.⁷ If the regulators set a guideline for service termination, this kind of opportunistic behavior can be reduced. In conclusion, setting a guideline for service termination is likely to contribute to the public welfare, especially considering the rapid pace of technology advancement in the wireless industry.

Secondly, when setting a guideline for service termination, regulators need to consider what to regulate. One key policy concern in KT's case was to set a timeline for service termination, which, more specifically, set forth when to announce termination and when to terminate a service. From a practical standpoint, KT's intended time span of three months for 2G service termination indeed

⁷ This issue of 'holdout' will be also taken up in section 4.

might have been too short, although it satisfied the condition specified in the Telecommunications Business Act, requiring that MNOs' announcements should be made to subscribers at least 60 days prior to the intended termination date. As stated in the previous subsection, Softbank and NTT Docomo announced their termination timeline 21 months and 38 months earlier than the scheduled termination dates. On August 3, 2012, AT&T announced that it would shut down 2G networks by January 1, 2017, which announcement thus came more than four years before the expected termination date (Goldstein, 2012; Gryta, 2012). Therefore, when compared to foreign MNOs' longer timeline for 2G service termination, it can be said that KT's time span appears far too short. By pre-announcing the timeline for 2G shutdown, MNOs would like to increase its positive effect of facilitating subscribers' voluntary migration to advanced services without compensation, while reducing the negative impact of pre-announcement on subscriber churn to other MNOs' services. Therefore, they might have incentives to keep the lead time as short as possible. This strategic choice of termination timeline, however, can go awry if MNOs do not take into account how strong subscribers' resistance and holdout incentives will be. If regulators set a standard lead time for service termination, MNOs' and subscribers' opportunistic behaviors as well as the uncertainties involved in termination process can be greatly reduced.

MNOs and regulators need to determine, thirdly, when they will execute involuntary service termination. When KT first announced its intention to terminate 2G networks, its 2G service subscribers were about 1.1 million, 6.7% of its mobile subscribers. When AT&T announced its 2G service termination timeline, its 2G service subscribers comprised about 12 % of total postpaid subscribers (Goldstein, 2012). The KCC granted permission for 2G service termination to KT after the ratio of the remaining 2G subscribers to KT's total mobile telephony users went down to below 1 %. In Korea, KT's case is likely to become a precedent for the other two MNOs' future 2G service termination. With regard to involuntary termination, regulators may specify the maximum number of remaining subscribers or the ratio of remaining subscribers to total subscribers. For the sake of fairness, it seems better for regulators to regulate the ratio rather than the absolute number. This is because otherwise an MNO serving more subscribers would have to incur more cost to keep its old service network. In the telecommunications industry, the cost of maintaining a larger network is greater than that of keeping a smaller network because network capacity and spectrum use are positively correlated with their

market shares (Nam, Kwon, Kim & Lee, 2009). However, if regulators put more emphasis on consumer welfare than on fairness among MNOs, an absolute number might be used as a criterion for forced termination because, in terms of societal impact, the magnitude of sacrificed consumers' welfare caused by forced termination depends on the number of remaining subscribers at the time of a forced termination.

IV. LEGAL AND ECONOMIC ISSUES RELATED TO KT'S 2G TERMINATION

KT's 2G termination process raises several issues that are worthy of discussion from the perspective of law and economics. First, subscribers who filed a class action suit complained that they had to give up their valuable phone numbers due to the termination.⁸ Whether they have rights to maintain their numbers is closely related to the question of whether property rights can be assigned to a phone number. Second, the people who filed a class action suit were criticized on the grounds that they were simply holding out to get better compensation. No one knows whether this accusation is valid, but how to deal with the holdout problem in service termination is a question worth asking. Finally, the question has been raised about whether KT's compensation packages were appropriate, based on the damage remedy criteria that are frequently adopted by the court.

1. Subscribers' rights to keep their phone numbers

What makes KT's 2G termination unique is its connection to the KCC's number integration policy. In Korea, it used to be the case that five prefixes (011, 016, 017, 018, 019; hereinafter "01X") were used to identify mobile phone numbers, representing the five old carriers that existed in the late 1990s. In 2002, the Ministry of Information and Communication (MIC), the former body of the KCC, decided that these prefixes should eventually be integrated into a single prefix: 010.⁹

⁸ Reported in Weekly Hankook (2012, December 2), Retrieved December 20, 2013
<http://weekly.hankooki.com/lpage/sisa/201112/wk20111201202142121210.htm>

⁹ There were several reasons underlying this policy, the main one being the expectation for increased competition among carriers through the 'un-branding' effect of the prefix.

According to this policy, every new 2G or 3G subscriber since January 1, 2004 should be assigned to a number with 010 as the prefix, which policy would also be applied to 2G subscribers who change their service carriers. This measure seems to have increased the value of existing 01X numbers for some people, as the prefixes came to be considered rare and unique.¹⁰ In 2010, KCC introduced the ‘Temporary Number Portability Order’ which allowed 2G subscribers to keep their 01X numbers for a limited time alongside their newly assigned 010 numbers when migrating to 3G services. A call transfer service was also provided until these 01X numbers are expired by MNOs. This order then linked the expiration date for 01X numbers to each carrier’s 2G termination plan.¹¹ For 2G subscribers, this meant that the only way to keep their existing 01X numbers without expiration was to prevent 2G service termination.¹²

Whether a phone number can be considered a ‘property’ is therefore quite important in evaluating the claim of subscribers who filed the lawsuit. In common law, property rights assign a person the right to possess, use, and dispose of a tangible or intangible thing. Property rights also give the right to exclude everyone else from interfering with them. Therefore, if a phone number is a form of property that is owned by an individual subscriber, the subscriber would have the right to refuse a termination of 2G service that would lead to the loss of a phone number.

However, traditional interpretation of property rights rejects the idea that a phone number can be a form of property.¹³ For example, the Federal Communications Commission (FCC) of the United States declared that the assignment of a number does not imply granting ownership and refuses to let subscribers transfer their phone numbers to one another.¹⁴ The US court has also found that a person does not own the phone number assigned to him or her, but instead a subscriber has a contractual right to use the number for a specified period through a service agreement with the carrier.¹⁵ In Korea, the KCC takes the stance

¹⁰ Reported in Digital Times (2010, October 29). Retrieved December 20, 2013.

http://www.dt.co.kr/contents.html?article_no=2010122902011232748002

¹¹ KT terminated call transfer service for 01X prefix on December 31, 2013.

¹² If they transferred to other carriers’ 2G services, they might have kept their numbers at least for a while. This would have been too costly, however, as they needed to buy new handsets and pay administration fees.

¹³ See Kweon and Kim(2013) for further discussion on this issue.

¹⁴ In re Toll Free Service Access Codes, Notice of Proposed Rulemaking (October 5, 1995) §37, and Second Report and Order and Further Notice of Proposed Rulemaking, (April 4, 1997) §38.

¹⁵ Jahn vs. 1-800-Flowers.com, Inc., 284 F. 3d 807, 810 (7th Circuit, 2002)

that a phone number is property owned by the public and not by an individual, and this position is supported by a recent ruling by the Korean Supreme Court.¹⁶ In sum, there is not the requisite controversy for a lawsuit in that people cannot claim a property right for their phone numbers, at least according to the current legal interpretation. Instead, a subscriber's interest in a phone number is limited to the contractual rights between the subscriber and the carrier.

Some criticisms can be made about such interpretation, however. Eisenberg (2007) argues that the denial of property rights for phone numbers makes the law incongruous in several respects and her arguments can be easily applied to the current context. First, there are certain aspects of this situation that make it natural to assign property rights to phone numbers. For example, mobile subscribers in Korea do not receive their numbers by random allocation, but instead ask for specific numbers that they can remember and manage well, and these numbers are given unless they have been already assigned. It is obvious that some numbers are more valuable to subscribers than others, and, in this sense, we might consider them as 'property,' given that the basic meaning of the term is 'a subject that has value.' Moreover, the number portability rule enforced by the KCC allows users to retain their numbers with the switch of telecom carrier (although this right has been denied for 01X numbers). Second, a subscriber spends time, energy and even money in spreading and promoting his or her phone number. According to John Locke's labor theory of property, the subscriber is then entitled to the fruits of labor—retaining the phone number for as long as is desired. Third, the lack of property protection for phone numbers contradicts common subscriber expectations. Subscribers in general expect that they can maintain the right to their phone number indefinitely, or at least have the option to do so. Finally, changes in technology often promote changes in property as new previously unanticipated usages are developed. It can be argued that if the law destroys the expectations that subscribers have in their phone number, "then something is wrong with the law," not with the subscribers.

It would not be within the scope of this paper to make a legal judgment about

¹⁶ The Korean Supreme Court, Case 2005Hu 346, May 12, 2006 §1. In this ruling, the Supreme Court rejected the argument that SKT, the largest mobile carrier in Korea, has exclusive rights for its service marks that include '011' such as 'Speed 011.' The court said that "the network identification number is a limited resource that is owned and managed by the public authority," and therefore the mobile carrier does not have proprietary and exclusive rights.

whether property rights should have been explicitly assigned to mobile phone numbers. It should be recognized, however, that we still need to approach the matter as if subscribers were entitled to some degree of property rights. As discussed in the previous section, the KCC did not grant permission for termination at first on the grounds that there were too many remaining subscribers, and the period of notice was too short. It might be argued that the KCC did this for consumer protection, but the extent of protection needed depends upon the nature and extent of the rights the subscribers initially have. The KCC in effect urged KT to negotiate with subscribers by providing appropriate compensation and wait until the majority of them switched their subscriptions voluntarily. Subscribers also made claims for due compensation for the relinquishment of their numbers. These features are similar to those experienced by developers who need to assemble land for construction. The only difference is that private developers cannot avoid negotiation until the last parcel of the land is acquired, but the KCC exercised its power to allow KT to discontinue its 2G service, although this decision was made only after the number of remaining subscribers was reduced to a negligible level. According to Korean law, the KCC had the legal authority to grant permission immediately after KT's petition for termination, but it has not exercised such power in reality. In this respect, both the KCC and subscribers somehow recognized and expected that a certain degree of property-like rights were given to subscribers.¹⁷ Unfortunately, however, there is no clear guidance regarding how extensive the rights expected by the subscribers should be.¹⁸

2. Holdout possibility and the issue of eminent domain

Another aspect that makes the KT's 2G termination process similar to a developer's land assembly is that there was the possibility of holdouts. Strategic holdouts occur when landowners delay and negotiate for a high price to extract some of the surplus that would be gained by the land assembler. This problem is well recognized in

¹⁷ The fact that some phone numbers have been traded, and the KCC has not been quite active in regulating such practices also support our argument.

¹⁸ Another way to approach this issue is to follow the traditional interpretation and acknowledge only contractual rights for subscribers. However, it is already clear that KT's CDMA (2G) service agreement does not contain any clause governing service termination in case of a network upgrade. We then have to go back to the question of which party has the decision rights in unforeseen events, though such rights are normally assigned to property owners.

the literature and considered a potential impediment to the successful completion of land projects.¹⁹ Some of the remaining subscribers reportedly demanded excessively high compensation.²⁰ Although not verified, some subscribers who filed the lawsuit were known to have numbers with the 010 prefix already, which raises the question of why they valued their 2G subscription so much. Even after the forceful termination of KT's 2G service, some people have reportedly been buying 01X numbers from 2G subscribers of SKT and LGU+ with the hope that they will receive hefty compensation in the future.²¹ Although these allegations are not direct evidence, it may be concluded that the problem of a strategic holdout does exist in 2G service termination.

Heller (1998) considers the holdout problem as a variant of the anti-commons problem in which multiple owners hold effective rights of exclusion in a scarce resource. Miceli & Segerson (2007) point out that a true holdout problem can only occur in cases of 'assembly', in the sense that individual parcels of land are not proportionally valuable. That is, the holdout problem is more severe when it is not feasible to commence a project until all parcels are acquired, yet this is exactly the situation that KT faced in 2G service termination. Unless no subscriber is left, it has to maintain 2G network facilities, and cannot reuse the 2G spectrum for the LTE service.

One general solution to the holdout problem is to take away the land owner's right to refuse to sell. The government has the right to do this for public use in most countries, on the condition that rightful compensation is made. For example, the Fifth Amendment of the U.S. Constitution says that "nor shall private property be taken for public use, without just compensation." Article 23(3) of the Constitution of Korea says that "expropriation, use, or restriction of private property from public necessity and compensation therefore are governed by law. However, in such a case, just compensation must be paid." This type of provision is often referred to as the 'eminent domain' or 'takings' clause in the United States.²² Since the freeing of the 2G frequencies and switching to LTE was considered necessary to increase public welfare through better utilization of natural resources, it would be justifiable to

¹⁹ See, for example, O'Flaherty (1994), Menezes & Pitchford (2004), and Miceli & Segerson (2007).

²⁰ Reported in Dong-A Ilbo (2011, November 24). Retrieved December 20, 2013. <http://news.donga.com/3/all/20111123/42104616/1>.

²¹ Reported in Digital Times (2010, October 29). See n.10

²² It is also called 'compulsory purchase' or 'expropriation' in other countries.

impose the eminent domain clause even if subscribers are given property rights for their phone numbers. Questions remain, however, over whether such a measure is always necessary, and what level of compensation is 'just' compensation if the eminent domain policy is used.

Shavell (2010) compares eminent domain with government purchases in the land assembly context. He shows that if the government's information about landowners' valuations is imperfect, the policy of eminent domain has the advantage over negotiated purchases if the number of owners of the land is large. His model does not consider strategic holdouts, in the sense that the landowners do not seek prices in excess of their true valuations, but the asymmetric information combined with the fact that any one owner refusing to sell can frustrate the project generates such a result. On the other hand, using the sequential Nash bargaining model, Miceli & Segerson (2011) show that the price rises with successive bargains, which also leads to the conclusion that the holdout problem is more likely when the number of landowners is large. Applying these results to the current context, we may conclude that it is more efficient for the government to give the carrier the right to exercise eminent domain. Of course, such a policy should be used only if it can be confirmed that 'just' compensation has been made.

3. Just compensation for subscribers

In the case of eminent domain, most courts have interpreted just compensation to mean fair market value, which is the price that will be paid if the property is put on the market. However, this is, in general, less than the amount owners would ask for their property in a consensual transaction. The reason for this disparity is clearly that the market equilibrium price represents the marginal owner's subjective value of the property, and those who refuse to sell are people who assign higher subjective value for the property. To make matters more complicated, it is not easy to assess the market value of maintaining a subscription to the 2G service, as it is the subscriber (a seller in the land assembly case) who pays for the service. Most theoretical literature on just compensation for eminent domain is of limited use as researchers tend to focus on providing the right incentives for the landowners regarding their investments in land.²³ Obviously, giving the right investment

²³ For example, see Blume, Rubinfeld, & Shapiro (1984), Fischel & Shapiro (1988), and Hermalin (1995).

incentives for subscribers is not the main concern of the 2G service termination.

To determine the right amount of compensation for 2G subscribers, it might be helpful to consider the rules for court-imposed damage remedies in the case of a contract breach. After all, KT's compensation was offered so that subscribers could recover damages that they would incur, if any, once the service contract is discontinued. Therefore, the standard rules for assessing damage remedies would provide a good reference point.

According to Cooter & Ulen (2008), there are three types of damage measures the court can impose—expectation damage, reliance damage, and opportunity cost damage. The expectation damage measure is the amount of money that the victim of a breach would have in order to be as well off as if the contract were performed. The reliance damage measure is the amount of money that leaves the victim as well off as if the contract would not have been made. Finally, the opportunity cost damage measure is the amount of money that the victim would need to make the next best contract. Barring estimation error, the expectation damage always tends to be the largest, while the reliance damage is the smallest.

If we apply the expectation damage measure to the current case, KT's compensation should cover all the costs that might be incurred by subscribers due to the termination of service. These include the investments subscribers would have made to promote their new numbers (for those who would have accepted the forced change), as well as the explicit and implicit costs for obtaining a new subscription. If the subscriber's current tariff plan is less expensive than any of comparable new subscriptions, then the difference should be compensated, too. On the other hand, if we apply the opportunity cost damage measure, the tariff difference does not have to be compensated. Finally, if the reliance damage is applied, the compensation would be zero unless we take into account the investments subscribers made to promote their 01X numbers, as this is the extent of the subscriber's reliance. See Table 3 for a comparison of the three types of damage remedies.

KT's compensation offer seems to be in between the expectation damage and the opportunity cost damage and is much higher than the reliance damage measure. For example, if the subscriber stayed with KT and switched to its 3G service, free handsets for choice were provided, and all the switching expenses (subscription fee, cancellation fee, and remaining installments) were waived. These cover the explicit costs for obtaining a new subscription. The discount of 6,600 won of the monthly rate would not be included in the opportunity cost damage and would partly cover

the tariff increase expected when switching to the 3G service, but this might not be enough to reach the expectation damage either, as the benefit only lasts for two years. Furthermore, some subscribers were known to have old special discount tariff plans that were not provided in the 3G service,²⁴ but it was unclear whether such plans were reinstated for those who switched.²⁵ On the other hand, KT offered a free call transfer service that presumably reduces the cost of promoting the new number although it is unclear that a call transfer service lasting only a limited time would cover all the implicit costs involved.

Therefore, we cannot say that KT's compensation package was not sufficient to cover any damage that was caused by the termination of 2G service. In fact, it might be argued that the package was too generous given the fact that KT did not introduce the number integration policy and should not be responsible for the damage from it. Nevertheless, the package was not considered lucrative by the remaining subscribers because they were accustomed to the Korean mobile operators' practice of giving away expensive handsets for nearly free in the competition to win carrier-switching customers.

V. CONCLUSION: KEY POLICY ISSUES AND SUGGESTIONS

This paper argues that telecommunication regulators can improve transparency and promote the public interest while reducing transaction costs and opportunistic behaviors of MNOs and subscribers by setting a standardized termination process for old telecommunications services. Their active involvement is also needed to promote the general public's interests in such matters as efficient use of scarce spectrum and technology development.

When regulators regulate the termination process for old services, they need to address at least three key policy issues. The first is to determine the minimum lead time from announcement to termination. In KT's case, the period of notice for service termination was considered far too short, especially compared to those of

²⁴ These special discount plans usually provided heavy discounts for calls among a designated group of subscribers.

²⁵ Initially, KT announced that it was designing special plans for switching subscribers but later did not include such plans in the final compensation package.

Japan and the United States. The next question, accepting that the lead time here was too short, is how long it should be? Considering that two year subscription contracts have become the norm today, at least in Korea, we believe the period of notice for service termination needs to be longer than at least two years. On the other hand, such regulation might turn out to be too restrictive if MNOs can easily induce voluntary transfer of subscribers, or are willing to offer larger compensation packages for a speedier process. Therefore, when regulators set a lead time shorter than two years, it might be better to consider also the condition for forced termination and whether other provisions for service termination can be fulfilled earlier than initially announced.

The second key issue is whether and when to give the power of eminent domain to MNOs. Considering that a spectrum is a valuable public resource, it does not seem efficient for MNOs to keep old networks until the last subscriber migrates voluntarily. A criterion for choosing a point of time for forced termination could be the ratio of remaining subscribers to total subscribers as used by the KCC. An absolute number condition could be also considered as a criterion, but, as discussed in section 3, it would place unequal burdens on MNOs when their market shares are asymmetrical.

The third key issue is whether regulators should set criteria for compensation packages. In the case of Korea, KT's package will function as a precedent that other MNOs will refer to when they terminate their own 2G services. Making a standard rule for compensation can simplify the termination process but it can also constrain the flexibility valuable to MNOs in formulating packages. Therefore, if regulators choose to set a rule, they should set a minimum level of regulation for consumer protection and let MNOs compose compensation packages flexibly, especially considering asymmetric information about subscribers between regulators and MNOs. The socially acceptable level of the minimum is up to the policy environment, but it should be less than the opportunity cost damage. This is because otherwise incentives to hold out would not be reduced, given that those who remain at the time of forced termination would still be likely to get the minimum level of compensation.

ACKNOWLEDGEMENTS

This paper has benefited from the comments offered by two anonymous reviewers. The early version of this paper was presented at the 2012 Annual Conference of the Korea Association for Telecommunications Policies, Seoul, Republic of Korea, and we thank professor Sa-Woong Kang for the constructive comments offered at the conference. We also thank Ms. Ruth Mendel for English proofreading.

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