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## **Barriers to Entry Analysis of Broadband Multiple Platforms: Comparing the U.S. and South Korea**

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### **Abstract**

This paper compares barriers to entry in the broadband markets between the U.S. and South Korea. First, it explores economic conceptions of barriers to entry from economics literatures. Second, it speculates how the conception of barriers to entry has been dealt with in the telecommunications industry. Also, it clarifies the various industrial factors that could prevent or make it difficult to successfully enter the residential telecommunications market. Third, it introduces an analytical framework that can be adopted for evaluating the barriers to entry. Forth, by employing the framework, the broadband markets in the U.S. and in South Korea were examined, focusing on barriers to entry in multiple broadband access platforms. Both the U.S. and South Korea has shown greater barriers to entry in wireline broadband markets such as cable modem and DSL compared to wireless broadband when it comes to a facilities-based entry. South Korea has offered more opportunity to non-dominant ISPs as a new entrant and thus, been able to facilitate a more vibrant competition nationwide. This paper concludes with an analysis of the barriers to entry of alternative broadband access platforms in residential high speed Internet services, more specifically, wireless access technologies including other economic and policy factors in the US and South Korea. The sluggish progress of intermodal and intramodal market competition explains a part of sluggish demand in residential high speed Internet access market in the U.S. while South Korean market could rapidly grow due to a fierce competition in the market, mostly facilitated by Korean government's open access rule and more favorable policy choices to new entrants rather than the incumbents. Furthermore, almost monopoly control of residential communications infrastructure of cable operators and telephone companies manifest as relatively high pricing and lower quality in the U.S. The more favorable terms the dominant providers have benefited from and government's deregulation may limit business opportunities for other Internet service providers.

## 1. Introduction

Assessing whether or not there are entry barriers in a certain industry has been one of critical methods for examining the presence of market power of the incumbents. Since a variety of entry barriers to a market will lead prices to increase greater than marginal cost and deter the entry of more efficient companies, it is detrimental to allocative efficiency and productive efficiency (Carlton & Perloff, 2005; Blees, et al., 2003).

When it comes to a residential broadband (or high speed Internet) market, the recent emphasis of the FCC on facilities-based competition and a series of deregulatory decisions have given rise to the debate whether the US competition policy (i.e., the abolishment of mandated open access rules to the incumbents' networks) will result in a greater competitive advantage to the incumbents and higher barriers to entry to new entrants (Weiser & Bleha, 2005; Scott & Aaron, 2005; Cooper, 2005; Kimmelman, 2005; Besing, 2005; Bleha, 2005).

Since 1999, wired access technologies such as Fiber and broadband over power line (BPL) and wireless access technologies such as Wi-Fi, WiMax and satellite have been promoted as would-be competitors in the foreseeable future.<sup>1</sup> However, the residential broadband market in the U.S. is still characterized by a dominant-fringe model as identified in the narrowband telephone market (Rosenberg and Clements, 2000). It is reasonable to believe that the residential broadband market will be a dominant-fringe cluster model because of the structure of two dominant leaders in each cluster (the ILECs and cable MSOs) with smaller entrants (Zhang, 2002). The incumbent sellers will initially retain large market shares with a fringe attempting to shave away the incumbent's customers. Traditional economic literature suggests that the smaller players will be price takers and face some significant challenges in entering these markets.

Despite the significance of entry barriers, there is lack of researches over how these new entrants with alternative technologies enter and serve the market and further, how the FCC's competition policy will influence these new entrants in the long run. We only guess that the impact of entry barriers would be different depending on the type of entrance, i.e., entrants with facilities and entrants without their own facilities. Also, it would be different between a pure new starter and an entrant that comes over from the other industry. Among alternative access technologies, the wireless group has been most potential because of their cost effectiveness compared to other technologies (CSTB, 2001; Zhang, 2002). The rapid adoption and expansion of service areas more recently through the incumbents, wireless ISPs and municipal governments shows its possibility.

On the other hand, increasing concern about lagging behind other countries in terms of the broadband penetration rate has been also rising with many academics and research analysts (Horrigan, 2005; Bleha, 2005; Frieden, 2005a, 2005b). In particular, South Korea has been an example to look at the impact of fierce competition on successful penetration rate in the residential broadband market. For a long time, the Korean government has enforced the

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<sup>1</sup> The FCC divides the access technologies into five mutually exclusive categories: "Asymmetric digital subscriber line (ADSL) technologies, which provide speeds in one direction greater than speeds in the other direction; wireline technologies *other* than ADSL, including traditional telephone company high-speed services and symmetric DSL services that provide equivalent functionality; coaxial cable, including the typical hybrid fiber-coax (HFC) architecture of upgraded cable TV systems; optical fiber to the subscriber's premises (e.g., Fiber-to-the-Home, or FTTH) and electric powerline; and satellite and terrestrial wireless systems, which use radio spectrum to communicate with a radio transmitter" (FCC, 2005, p.13).

unbundling mandate and line sharing rules to the incumbent network providers both in the narrowband in the past and in broadband currently. Thanks to the more favorable policy towards new entrants, South Korea has enjoyed more viable competition on both intermodal and intramodal bases compared to the U.S. (Lau, Kim and Atkin, 2005; Han, Byun & Lee, 2005; Lee & Chan-Olmsted, 2004). Thus, the key inquiry to the case of South Korea would be the size of entrance rather than the shape, for example, whether it will be a small entrance in a certain region or a nationwide entrance regardless of the presence of facilities. As a result, the size of entrance will determine entry barriers to the residential broadband market in South Korea. Despite a vibrant competition between DSL and cable modem in South Korea, alternative broadband platforms such as wireless and BPL have not been shaped as competitors in the market just as in the U.S. Thus, they have been regarded as complementary access technologies to the incumbents rather than competitive technologies (Koh, Lee, & Kim, 2005).

Thus, this paper examines whether there are barriers to entry for new entrants to enter the residential high speed Internet market in the U.S. and South Korea by applying barriers-to-entry theories derived from the industrial organization approach. In particular, the comparison of both countries will give more insight and useful implications to the policy makers and the industry than when we care only one country in terms of broadband competition policy. It will scrutinize each broadband access platform in the U.S., especially paying more attention to wireless technologies, and this analysis will be compared to that of South Korea.

Research questions are as follows: Which barriers to entry exist to new entrants in residential broadband access market?: How have these barriers to entry affected the actual entry of the residential wireless broadband access market?: How are entry barriers of the U.S. broadband market different from entry barriers of the South Korea broadband market? To answer those questions, this paper employs a qualitative case study based upon an exclusive set of data sources such as government documents, law reviews, statistical reports, news reports, scholarly theoretical works, commercial reports etc.

This paper concludes with an analysis of the barriers to entry of alternative broadband access platforms in residential high speed Internet services, more specifically, wireless access technologies including other economic and policy factors in the US and South Korea. It may find that the sluggish progress of intermodal and intramodal market competition explains a part of sluggish demand in residential high speed Internet access market in the U.S. while South Korean market could rapidly grow due to a fierce competition in the market, mostly facilitated by Korean government's open access rule and more favorable policy choices to new entrants rather than the incumbents. Furthermore, almost monopoly control of residential communications infrastructure of cable operators and telephone companies manifest as relatively high pricing and lower quality in the U.S. The more favorable terms the dominant providers have benefited from and government's deregulation may limit business opportunities for other Internet service providers.

The paper is organized as follows. Section 2 presents theoretical perspectives based upon economic concepts of entry barriers. The section will shed light on how the barriers-to-entry debate has been developing and which discrepancies exist in a variety of theoretical perspectives. It also reviews the existing literature that has ever dealt with this subject regarding to the competition issue in telecommunications. A part of Section 2 implies how telecommunications industry is different from other product industries which major economic discourses have considered. With these understandings about barriers to entry, Section 3 introduces an analytical framework which can be used for evaluating the existence of entry barriers in the

telecommunications industry and discusses each step. Section 4 examines broadband markets in the U.S. and South Korea briefly and discusses possible entry barriers. The last section discusses the commonalities and differences between two countries, and concludes.

## 2. Literature Review

### 2.1. Historical debates on the definition of entry barriers

Entry barriers do not have any coherent and widely-accepted definition. Indeed, there is no economic term to have much controversy over the definition more than this concept. A barrier to entry is a multifaceted term which can be defined in various ways and distinguished to many different groups: Natural barriers versus artificial barriers (White, 1989), natural barriers versus strategic barriers to entry (Woroch, 1990), structural barriers versus strategic barriers (Blees, et al., 2003; McAfee et al., 2004), and more precisely, economic, antitrust, standalone and ancillary barriers (McAfee et al., 2004).<sup>2</sup> Also, it can be viewed from the perspective of the entering firm and from the perspective of incumbent firms. Historically various viewpoints have kept their own perspectives differently one another in light of structural features, entry impacts on market performance and the value of incumbency. The historical explanation about the term can be found in McAfee et al. (2004) and in Geroski, et al. (1990) more in detail (see table 1).

Table 1. Various definitions of barriers-to-entry

Scholars	Emphasis	Features
Bain (1956)	-Anything that allows incumbent firms to earn above-normal profits without the threat of entry.	-Failure to articulate a consistent theory -positive
Stigler (1968)	-Differential costs between the incumbents and new entrants	-Narrower than Bain's definition; Far stricter -positive
Ferguson (1974)	-The incumbents' ability to set prices above marginal cost and to earn monopoly return	Advertisements are not a barrier depending on a case.
Fisher (1979)	-Anything that prevents entry when entry is socially beneficial. -Incumbents' unnecessarily high profits without entry	-Accepting Bain's and Ferguson's definition. -Normative -an initial capital requirement not a barrier
Von Weizsacker (1980)	-Differential costs between incumbents and entrants -Any advantage over an entrant that an incumbent firm enjoys <i>if that advantage produces a welfare loss</i> .	-Based on Stigler's definition -Normative definition -Only if its consequences are undesirable, the advantage is a barrier to entry.
Baumol, Panzar & Willig (1982)	-anything that reduce the sum of consumers' and producers' surplus, while phenomena such as fixed costs and scale economies deed not do so (p.282).	-Incumbents can have costs lower because of the superior efficiency. -Such a cost difference is not a barrier to entry.

<sup>2</sup> To date, barriers-to-entry has been discussed in two different, sometimes overlapping streams of literature: industrial organization and strategic management (Blees et al., 2003). Strategic management literature takes the perspective of individual companies and describes what they can do to enhance their performance. Although the strategic-management literature contributes to the understanding of the rationale behind the strategic actions of companies to create barriers to entry, this paper is more interested in the whole telecommunications industry rather than individual firm's strategic actions. Therefore, most literatures reviewed here were derived from the industrial organization model of the structure-conduct-performance framework even though these theoretical underpinnings have been criticized for their intrinsic defects (Carlton, 2005).

Gilbert (1989)	-A rent derived from incumbency	-Sunk costs: both a barrier to exit and a barrier to entry -Defining entry barriers from the perspective of incumbents
Carlton & Perloff (1994)	-Both costs of entering and the time required to enter	-Incorporates a time dimension -Based on Stigler's definition
Church & Ware (1999)	-A structural characteristic of a market that protects the market power of incumbents by making entry unprofitable	-Distinguish between structural and strategic barriers -Only structural barriers are barriers to entry
McAfee, Mialon & Williams (2004)	Distinguishing the concept of barriers to entry into <i>economic, antitrust, standalone, and ancillary ones</i>	More precise and sophisticated distinctions

Source) McAfee, et al. (2004), Baumol, Panzar & Willig (1982)

## 2.2. Bain's structural barriers and Stigler and Chicago school's barriers

In the economic literatures, the most controversial distinction has been whether the definition of a barrier to entry follows either Bain's or Stigler's. To put it simply, the concept of barriers to entry has been defined differently based on whether it focuses on above-normal profits of incumbents or cost difference between incumbents and new entrants. Barriers to entry in the industrial organization literatures go back to Bain (1956). He focused on the consequences of barriers to entry, i.e. a higher price than the price hypothetically attributed to long-run equilibrium in pure competition. Bain (1956) defined as below,

A barriers-to-entry is an advantage of established sellers in an industry over potential entrant sellers, which is reflected in the extent to which established sellers can persistently raise their prices above competitive levels without attracting new firms to enter the industry (p.3).

Based upon this definition, Bain identified important market characteristics that can have significant effect on the condition of entry: economies of scale, capital requirements, absolute cost advantages, and differentiation advantages (Bain, 1956).

However, a slightly different perspective in the industrial-organization literature (Chicago school) looks at the costs that must be borne by an entrant to a market that need not be borne by an incumbent already operating in the market (asymmetry of costs). Emphasizing differential costs between incumbents and new entrants, this perspective was initiated by George S. Stigler. He rejected Bain's basic contention that scale economies and capital requirements are barriers to entry, and developed his own definition, below.

A barriers-to-entry is a cost of producing (at some or every rate of output) which must be borne by firms which seek to enter an industry but is not borne by firms already in the industry (Stigler, 1968, p.67).

This implies that the incumbents and entrants are not equally efficient after the costs of entering are taken into account (i.e., the conditions for entering for the incumbents were less difficult than for later entrants). A barrier to entry exists only if the potential entrant's long-run costs after entry are greater than those of the incumbent. The practical distinction between the two definitions lies in the way economies of scale are treated as a barrier to entry. In Bain's definition, economies of scale are a barrier to entry because entry will lead to a price reduction and the post-entry profits are likely to be lower than the incumbents' pre-entry profits. In the Stigler definition, scale economies do not represent a barrier to entry if they imply penalties from sub-optimal levels of production that are the same for the incumbents and the entrant. In any given industry, entrants and incumbents enjoy the same scale economies as they expand their output. With equal access to technology, therefore, economies of scale are not a barrier to entry

according to Stigler (McAfee, et al., 2004). Also advertising and capital requirements create barriers for Bain because they seem correlated with high profit rates, but so long as these inputs are available on equal terms to all who wish to employ them, they create no barriers for Stigler (Demsetz, 1982, p.48).

The Stiglerian conception of entry barriers is based on a powerful analytic point: entry barrier analysis should distinguish desirable from undesirable entry. If prospective entrants face precisely the same costs that incumbents faced but still find entry unprofitable, then this market has probably already attained the appropriate number of players, even though monopoly profits are being earned. In this case, the socially desirable solution to the problem of oligopoly performance in this market is not to force entry of a further number of entrants but rather to look for alternative measures that make collusion more difficult (Hovenkamp, 1999, p.40).

As shown in the table 1, the various definitions of barriers to entry can be distinguished into Bain's (Bain, Ferguson, Fisher and Gilbert) and Stigler's definition (Stigler, von Weizsacker, Carlton and Perloff). Stigler defined barriers to entry in a more concise and precise way than Bain (Table 2).

Table 2. Bain's and Stigler's definitions of entry barriers

	<b>Barriers</b>	<b>Bain's definition</b>	<b>Stigler's definition</b>
<i>Structural</i> barriers to entry	Economies of scale	O	X
	Switching costs	O	O
	Brand loyalty	O	O
	Capital costs	O	X
	Absolute cost advantages	O	O
	Informational advantages	O	Δ
	Organizational advantages	O	X
	Asset specificity	O	O
	Patent, intellectual property	O	X
	Regulatory barrier (license)	O	Δ
	Essential facilities	O	X
<i>Strategic</i> barriers to entry	Intense advertising	O	X
	Sunk costs	O	X
	R&D costs	O	X
	Reputation	O	X
	Contracts to block distribution	O	O
	Excess capacity	O	X
	Price discrimination	O	X
	Tying	O	X
	Collective product proliferation	O	X
	Lobbying to raise entrant's cost	O	X
	Exclusive patent cross-licensing	O	X
	Vertical foreclosure	O	O
	Predatory behaviors	O	X

Source) Kim & Lee (2005) O a barrier to entry Δ depends on the situation X not a barrier to entry

In theoretical perspective, Stigler's definition is more sophisticated than Bain's. Thus, it has been widely accepted in the dominant definition of a barrier to entry in the economics literatures. It should be noted, however, that the real application in competition policy has adopted Bain's definition more widely than Stigler's. Bain's definition has been incorporated in the Horizontal Merger Guidelines of the Department of Justice (DOJ) and the Federal Trade Commission (FTC). Excluding some exceptions, most of the U.S. antitrust cases have been

based upon Bain's approach (Hovenkamp, 1999). Hovenkamp (1999) suggests that the reason for this wider acceptance of Bain's definition is that Bain's approach is more likely to be free of the value judgment of what constitutes socially desirable entry (Hovenkamp, 1999, p.40).

This paper incorporates Bain's approach rather than Stigler's approach because the Bainian approach could consider much broader industrial factors which make new entry difficult and also allow incumbents to wield their market power by setting up prices above the competition level. On this occasion, the Stiglerian definitions would be much strict and narrow despite of its precision. For example, economies of scale, advertising and capital requirements cannot be barriers under the Stigler's conceptual definition otherwise they would be barriers under Bain's range of barriers. Indeed, every possible market factors that can produce profit difference could belong to barriers to entry according to Bain's (table 2).

On the other hand, McAfee, Mialon & Williams (2004) distinguished entry barriers into four different groups to avoid the confusion caused by the various definitions above: economic, antitrust, standalone, and ancillary barriers. These groups embrace both Bain's and Stigler's approach altogether into a barriers-to-entry model. While agreeing the difficulty to measure the variables, they have been successful to catch all plausible barriers for the consideration as avoiding unnecessary controversy.

According to their categorization, scale economies are ancillary barriers to entry that reinforce other barriers to entry such as customer switching costs and brand loyalty. A standalone barrier to entry is a cost that constitutes a barrier to entry by itself. For example, brand loyalty, absolute cost advantage, price discrimination, tying and lobbying to raise entrants' costs. An ancillary barrier to entry refers to a cost that reinforces other barriers to entry if they are present such as economies of scale, capital costs and informational advantage. For example, scale economies can reinforce customer switching costs and brand loyalty. An economic barrier to entry is a cost that must be incurred by a new entrant and that incumbents have not had to incur, or a cost-time tradeoff that must be faced by a new entrant and that is less favorable to the new entrant than it was to incumbents when they entered the market. An antitrust barrier to entry is a cost that delays entry, and thereby reduces social welfare relative to immediate but equally costly entry. According to the distinction of McAfee et al. (2004), structural barriers and strategic barriers have economic barriers and antitrust barriers respectively and economic and antitrust barriers can be distinguished into either standalone or ancillary barriers as well (table 3). Thus, these definitions are more comprehensive and precise as they embrace various definitions discussed in the previous literatures.

Table 3. Classification of entry barriers by McAfee et al. (2004)

		Economic barriers to entry		Antitrust barriers to entry	
		Standalone	Ancillary	Standalone	Ancillary
Structural barriers to entry	Economies of scale				○
	Switching costs			○	
	Brand loyalty	○		○	
	Capital costs				○
	Absolute cost advantages	○		○	
	Informational advantages				○
	Organizational advantages		○		○
	Asset specificity		○	○	
Strategic	Intense advertising			○	

barriers to entry	Contracts to block distribution			○	
	Excess capacity		○	○	
	Price discrimination	○		○	
	Leave-only marketing		○	○	
	Tying	○		○	
	Collective product proliferation				○
	Lobbying to raise entrant's cost	○		○	
	Exclusive patent cross-licensing		○	○	

On the contrary, Carlton (2005) points out that the previous Bain's conception of entry barriers is based on a wrong theoretical footing of a simple structure-conduct-performance framework. Also Stigler paid no attention to dynamics or sunk costs and only focused on the long-run steady state. Carlton suggests, therefore, that the conception of entry barriers has to incorporate a time dimension and market dynamics in barriers to entry models such as adjustment costs, sunk costs and uncertainty in the market. Even though these variables are hard to be measured, this model embraces more realistic dimensions. Carlton's insights should be incorporated into an evaluative framework for assessing barriers to entry in a market, which will be addressed in the following section.

In sum, the previous economic literatures have discussed which industrial factors should be included as barriers to entry in general terms. In particular, most of these studies have focused on which industry has more (or higher) barriers compared to other industries (Bain, 1956; Schmalensee, 1989; Carlton & Perloff, 2005). Important as it is in many antitrust contexts to go beyond the Bain and Stigler definitions to take into account the dynamics of entry (as Carlton, 2005 and McAfee et al., 2004), economists unfortunately seem to have produced very little potentially relevant theory and essentially no systematic empirical analysis of factors that slow entry. They also fail to articulate which barriers are more important compared to other barriers in an industry although the importance of barriers in deterring entry of competitors into markets varies by products and industries (Karakaya and Stahl, 1989; Yang, 1998). The effect of a structural industry factor on the entry will vary enormously across industries as well. Thus, to more elucidate the definition of barriers to entry, the contextual factors of an industry should be considered. In particular, the telecommunications market featuring two-way networks and network externalities (Economides and white, 1994) has been told as having a distinguished structure and its own barriers. An important feature of networks (and of services provided over networks) is that they are typically composed of various complementary components that are combined to create composite goods (or systems) that are substitutes to each other. Thus, traditional approaches that dealt exclusively with substitutes or complements fail, and new theoretical and empirical analysis are required (Economides, 1996).

### 2. 3. Barriers to entry in the telecommunications market

Explicitly identifying the presence of barriers to entry and their characteristics will be very important not only of the systemic evaluation and prediction of market competition but also for imposing a priori obligations on the incumbents with market power and establishing a proper competition policy.

The telecommunications networks can be characterized by high threshold levels of

investment, which causes the existence of substantial sunk costs and a high fixed to variable cost ratio, significant economies of scale and scope, and externalities (Miller, 1995; Brock, 1981). As related to previous discussion, economies of scale have been one of the most important features in the telecommunications network industry regardless of whether it is considered as an entry barrier or not.

For example, Gabel (2002) enumerates three sources of economies of scale in the local telecommunications market and defined the economies of scale as a critical barrier to entry. First, new entrants have to install facilities such as putting up poles, digging trenches, or laying conduit. These economies of scale exist because of the high capital and construction costs that require at least a minimum scale, and furthermore, are an additional barrier to entry because the fixed costs are also sunk once the facilities are built. Sunk or irreversible costs deter entry because they increase the risk associated with entry. Incumbent firms have a strategic advantage if the entrant must incur costs that are not part of the forward-looking opportunity costs of the incumbent. These additional costs create a barrier to entry because the incumbent firms' opportunity costs are lower than the entrants' and, therefore, the incumbents will be able to underprice their potential rivals (Baumol, Panzar & Willig, 1982; cited in Gabel, p.3). Second, the back office fixed cost of setting up a billing and operational support system will be a source of economies of scale. Third, the economies of scale exist in customer acquisition costs because any company incurs certain minimum expenses that are largely independent of the number of customers served such as developing an advertising and marketing campaign for a particular geographic area.

Although Stigler's definition has been well accepted among modern economists, several economists accept the scale economies as a critical source of barrier (Geroski, et al., 1990; Nahata & Olson, 1989). Geroski et al. (1990) argue that if economies of scale permit established firms to limit the market available to new entrants, then they are a source of entry barriers. For example, they showed an example when production involves substantial sunk costs. In this way, strategy and structure may interact to create barriers and to sustain profitable operations by the incumbents.

Nahata & Olson (1989) empirically introduced a situation in which scale economies can act as a barrier to entry. Within the context of the Cournot model with scale economies, there exists a critical number of incumbent firms such that industry cost and demand conditions require a new firm to enter at so large a size that post-entry prices lead to economic losses. The potential entrant would not enter the market even if incumbent firms earn supra-normal profits. The conditions under which scale economies serve as a barrier to entry can be defined solely in terms of demand and cost elasticities and the number of firms in the industry. Nahata and Olson's econometric model shows that the role of scale economies in providing supra-normal profits generally diminishes as the number of firms in an industry increases. Thus, according to Nahata and Olson (1989), economies of scale will usually be a significant barrier to entry only when the critical number of firms is fairly small. Although there is no barrier in the Stigler sense of the term, scale economies provide incumbent firms with supra-normal profits and prevent the entry of one additional firm.

In particular, the telecommunications networks are prominent to have economies of scale with sunk costs. More recently, Sidak (2006) summarizes economic characteristics of broadband networks as following: First, a broadband network requires substantial sunk investment. The sunk investment should be made continuously over time. Second, a broadband network exhibits economies of scale. The large sunk costs of building a broadband network imply that the marginal cost of providing service to one more consumer is very low. However, marginal cost

pricing is insufficient to recover even the average variable cost of the network, much less the average total cost, which would be necessary to recover the sunk costs of building the network. Third, a broadband network exhibits economies of scope. In other words, there are synergistic 'common costs' to producing multiple products over the same network. Fourth, differential pricing can increase economic welfare because it enables a firm to lower the price to consumers who would otherwise be priced out of the market if the firm were constrained to charge a higher uniform price.

As indicated in the literature, either DSL lines or cable networks are representative telecommunications networks with substantial sunk costs, economies of scale and scope. Thus, in broadband access market, if a new entrant is going to enter into the nationwide market, barriers to entry would be very high to entrants that could not realize economies of scale. But barriers to entry would be rather lower to entrants with economies of scale compared to entrants without scale economies. Even though new access technologies, like wireless, satellite and power-line, are being able to overcome some kind of barriers inherent in the residential broadband access market, they still need to prevail over scale economies to get profitable in the market.

### **2.3.1. Determinants of market entry in local telecommunications markets**

Previous literature in telecommunications has mostly discussed the determinants of market entry in local telecommunications market and there is rare literature that deals with only barriers issue in the telecommunications industry. The previous studies of entry determinants, thus, will shed light on understanding which market factors will behave as entry barriers and which factor is more important than other barriers. What industrial factors have intervened (or encouraged) a new entry will help comprehend the barriers in the residential broadband access market.

First, the market size is related to new entry of complete local exchange carriers (CLECs) (Beard, Ford & Koutsky, 2005; Alexander & Feinberg, 2004; Greenstein & Mazzeo, 2003; Zolnierok, Eisner & Burton, 2001). Beard et al. (2005) examined the entry pattern of CLECs in the US local exchange markets and found that a larger market is likely to lead to an additional CLEC's entry. Greenstein and Mazzeo (2003) examined the entry strategies of CLECs and found that market size is positively correlated with the entry of CLECs. Alexander and Feinberg (2004) examined the determinants of entry in local exchange markets and found that an increase in population increases the likelihood of new entry. Zolnierok et al. (2001) also found that a new local exchange competitor is more likely to enter into highly populated urban areas. This positive relationship between market size and new entry can be applied to broadband market as well, indicating that the new entrance in the residential broadband market must be starting from urban areas with a large population.

The size is also associated with the local demand potential. A higher local demand potential with high income and high population density tends to increase of CLEC's entry (Clarke, Hassett, Ivanova & Kotlikoff, 2004; Rosston & Wimmer, 2001). Clarke et al. (2004) found that there was additional CLEC's entry in both high income and high density markets. Rosston and Wimmer (2001) also examined factors leading to the entry of CLECs into local exchange markets and found that CLECs are more likely to enter into high income and densely populated markets.

Second, entry costs are negatively associated with new entry into the U.S. local exchange markets, suggesting that a decrease in entry costs leads to a higher probability of entry (Rosston

& Wimmer, 2001). This indicates that higher costs will deter additional entries and new entrants are likely to enter the market in smaller scale than the exiting companies.

Third, regulatory policies in the U.S. local exchange industry affect the pattern of new entry. Specifically, a few studies have examined the relationship between the difference in regulatory schemes of state PUCs and the entry pattern into the U.S. local exchange markets (Abel & Clements, 2001; Alexander & Feinberg, 2004). Abel and Clements (2001) investigated whether asymmetric regulation leads to additional entries and found that asymmetric regulation leads to a great number of entries into local telephone markets. They also examined whether the characteristics of state PUCs have an impact on the entry of CLECs and found that republican-oriented state PUCs are less likely to lead to the entry of CLECs. Alexander and Feinberg (2004) found that the probability of the entry of CLECs is higher in the markets where the ILEC is regulated by the traditional regulatory method, such as the rate-of-return regulation.

On the other hand, other studies have investigated the relationship between the changes in policies in a federal level and new entry into the U.S. local exchange markets (Brown & Zimmerman, 2004; Rosston & Wimmer, 2001). Brown and Zimmerman (2004) examined the effect of the FCC section 271 decision on new entry into the local exchange market and found that the decision had increased new entry into local exchange markets before and while the approval was granted. Rosston and Wimmer (2001) examined the effect of the federal subsidy policy on competition in local exchange markets and found that the presence of a federal high-cost support increases the probability of new entry.

As indicated in the literature above, regulatory policies more favorable to new entrants to eliminate entry barriers such as open access rules (e.g., unbundling and resale entrance) and subsidy assistance (universal service support) have increased the entrance into the local telecommunications market. Since CLECs tend to provide DSL services altogether with a local telephone service, higher number of CLECs indicates higher number of broadband providers in the residential market. Thus, higher barriers to entry for CLECs imply higher barriers to entry to Internet access service providers that may enter the market by either resale or unbundling. However, it is suggested that the FCC's "systematic elimination of pro-competitive regulation" have led to declining market share of CLECs in the wired broadband access service (Marcus, 2006, p.31). As a percentage of all ADSL lines, CLEC ADSL lines have steadily declined to 4.3% in 2004 from 5.4% a year ago.

### **2.3.2. Incumbents' strategies for deterring new entry**

A body of literature has also been interested in the pre- and post-entry behavior of an incumbent in the U.S. local exchange markets. Some studies have examined the pre entry deterrence of an incumbent in a market (Nix & Gabel, 1993; Rosenberg & Clements, 2000). For example, Rosenberg and Clements (2000) found that an ILEC deters an entry by reducing or eliminating the potential competitor's profit opportunities by imposing high costs. Nix and Gabel (1993) also suggested that, historically, a telephone carrier, for example, the AT&T, did not adopt a price strategy to deter new entry when the company had an increasing threat of competition, but instead, leveraged patent litigations to deter new entry.

Other studies have examined the relationship between new entry and an incumbent's post-entry reaction in a market (Kaserman, Mayo, Blank & Kahai, 1999; Koski & Majumdar, 2002; Loomis & Swann, 2005; Woroch, 2000). Kaserman et al. (1999) examined the effect of the entry of facilities-based inter exchange carriers (IXCs) on the pricing of Regional Bell Operating Companies (RBOCs)' local residential telephone services and found that the entry

does not significantly influence the local residential rates of RBOCs.

Koski and Majumdar (2002) examined whether new entry into the U.S. local exchange markets affects the behavior of Incumbent Local Exchange Carriers (ILECs) in terms of pricing, advertising and the extent of diversification. The authors found that the reaction strategy of ILECs is not related to an aggressive pricing but related to advertising, and ILECs cut back the extent of diversification when they face with the entry of a new competitor.

Xiao and Orazem (2005) more recently examined the market structure and competitive conduct in local markets for high speed Internet service from 1999 to 2003. They found unreasonable variation in firms' competitive conduct over time. Once the market has one to three firms, the next entrant has little effect on competitive conduct. Also, they found that entry costs for early entrants are smaller than for later entrants, implying the existence of early mover advantages in this market. Thus, they conclude that sunk costs are a main determinant of entry thresholds so that ignoring sunk costs leads to biased measures of entry thresholds and misleading interferences about firms' competitive conduct. These findings indicate that there will not be much difference in the existing companies' competitive conduct with the third competitor, and new entrants should decide their entrance based more upon strategic barriers established by the first mover's advantage such as a highly recognized brand name and sunk cost.

As suggested in the previous literature, it seems evident that the incumbents in the local telecommunications network market have had the competitive pressure on their telecommunications services but they are more likely to employ intense advertising or other leverages to erect barriers rather than to compete with price directly.

### **3. Analytical Framework: Evaluation of the presence of barriers to entry**

The evaluation of barriers to entry in telecommunications has contributed to either evaluate the market power of the incumbents or limit requested mergers considering their impacts on market competition. The Office of Fair Trading in the U.K. earlier published a report about suggesting the best practice to assess barriers to entry in a market and proposing methods of measuring entry barriers (OFT,1994).

Adjusting the OFT's "seven step procedure for assessing entry conditions" to the telecommunications market, Kim and Lee (2005) suggested eight evaluation steps of barriers to entry and conducted a case study about South Korea's retail broadband access market. The eight evaluation steps are; (1) the establishment of market boundary and production substitutability; (2) market conditions and the record of entry and exit (3) absolute cost advantages of the incumbents; (4) sunk cost, economies of scale and capital requirements; (5) product differentiation, advertising, switching cost, and network externalities; (6) vertical foreclosure and exclusion; (7) predatory behavior; (8) entry impediments such as certification requirements and required time to build up brand name.<sup>3</sup> Each step will be examined with essential questions as following:

#### **Step 1. Market definition and entry by production substituters**

First, it should be investigated whether one or more firms in a market face competition from 1) existing rivals and 2) from potential new entrants. So-called "production substituters" are included in the definition of relevant market and the focus here is entirely on demand substitutability. Questions as below need to be answered: Are there potential suppliers or production substituters that could switch easily and quickly to the supply of the relevant market?

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<sup>3</sup> Hereinafter, 8 steps are mostly derived from the Office of Fair Trading (1994)'s enumerated discussion about barriers to entry.

Are there neighboring industries or markets which use a similar production technology? Are there producers which use similar distribution channels and distribution networks that could start production or acquire the relevant market? Are there firms which produce the relevant product in other geographical markets? Has there been import substitution in the past in response to changes in domestic or external market conditions?<sup>4</sup> More questions follow: Has there been product substitution in the past in response to a price increase in the relevant market? Is there idle capacity in the industry? Are there large buyers who could easily supply themselves? Are there vertically integrated firms who could easily increase their production to serve the open market? If one or more of these questions yields a positive answer, then this may be prima facie evidence of an absence of serious entry problems.

### **Step 2. Market conditions and historical entry**

Factual information about the recent performance of firms in the relevant market is a useful guide in the assessment of entry conditions. What has been the recent history of entry and exit in the relevant market? What has been the recent trend of profitability of the industry? How effective has entry been in constraining the exercise of market power? Have market conditions changed recently? If recent market history exhibits substantial entry via investment in new capacity on a large scale, then there is a priori little reason to suspect that significant barriers to entry exist. However if successful entry has been exclusively large-scale then the existence of scale economies may be suggested. If entry has been small-scale, short-lived or merely by acquisition, more investigation will be required. Empirically most entry is of this type, so it is not enough simply to observe or count recent entry episodes. Rather some measure of scale and significance of entry must be used. The profitability of firms and time required for a new entry, change of market competitiveness such as change of the number of active firms should be questioned.

### **Step 3. Assessment of absolute (cost) advantages**

Absolute cost advantages can be defined as costs which must be born by the entrant by which are not born by incumbents. They correspond to the cost asymmetries between firms which would normally be captured under the Stiglerian definition of barriers to entry. Examples include exclusive or superior access by an incumbent firm to particular necessary inputs such as patents, copyright, exclusive contracts with input suppliers, ownership of a network, etc. Most legal and regulatory barriers to entry come under this heading. Cost asymmetries due to superior efficiency of incumbents however should not be included.

### **Step 4. Sunk cost, economies of scale and capital requirements**

If entry requires that some costs be sunk then what matters to entrants is the expected price post-entry. This will be determined by a number of factors, but perhaps the most important is the nature or intensity of expected post-entry competition in the market. Hence an important, if subtle and difficult, question which must be addressed in any serious analysis of barriers to entry is: What is the nature and what are the instruments of market competition? How has the market reacted to entry in the past? Price wars, accommodation, collusion, etc.? How has the market

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<sup>4</sup> However, this question is not applicable in the telecommunications market because the ownership from the outside of domestic boundary would be strictly controlled by the government.

responded to exit in the past? Price increases, output reductions, reestablishment of stable or collusive pricing strategies etc.? How sunk are costs? Short-term, long-term. What is the proportion of sunk costs to total costs?

### **Step 5. Product differentiation, advertising, switching costs and network externalities**

The interaction of sunk costs with economies of scale to create barriers seems occur in telecommunications market (Gabel, 2002; Sidak, 2006). In industries where products are differentiated, however, advertising, brand proliferation and goodwill have been identified as possible important sources of (strategic) barriers to entry in some circumstances. If sunk costs are required to advertise or establish a market presence etc. then entry is in general more risky, and incumbents may be in a position to exploit first mover advantages. The rapid development of technologies has made it possible to produce a variety of services in telecommunication industry and this makes product differentiation and advertising more critical strategic barriers to entry.

Some critical questions can be addressed as following: Are products highly differentiated? Associated with brand names? How important is R&D in the industry? Is product development important? How important is advertising? What is the ratio of advertising expenditure to sales revenue? Do consumers face switching costs, i.e. are they locked in to a specific supplier, or is it more costly for them to purchase from alternative suppliers for reasons unrelated to price and production costs? How large are switching costs? And what strategies are available to firms to create consumer loyalty, i.e. exclusive contracts, loyalty rebates and discounts, price-matching strategies, etc.?

### **Step 6. Vertical foreclosure and exclusion**

A long list of practices can be identified as vertical restraints such as vertical integration and vertical mergers, exclusive dealing and contracting, exclusive territories and franchising, exclusive/long term contracts with customers, refusal to supply and product tying and bundling. This list is not all inclusive but is suggestive of the range of practices which have been considered to raise antitrust concerns by creating entry barriers. The difficulty posed for competition authorities by these analyses is to identify when these types of conduct and other vertical restraints, are likely to have serious anticompetitive effects. Gabel (2002) detects that without vertically integrated structure, new entrants based on structural separation are likely to fail because they would increase rather than reduce uncertainty.

In particular, telecommunications industry has shown a strong trend of vertical integration by networks. To communicate in the telecommunication network, the sender and the receiver has to be connected through the physical networks with the premises as well. In most countries, a monopolist which owned both the last mile and interconnected networks had been providing the end-to-end service. Plausible questions are as following: What is the nature of incumbent relations with input suppliers or distributors/retailers/buyers? Are there exclusionary contracts? Tying arrangement? Territorial exclusion? Long-term contracts? Loyalty rebates? Most favored clauses? Are there scarce inputs needed for the production of the relevant product(s) which are controlled by incumbent firms? What is the market structure of essential input markets, and are incumbents able to exert market power in these markets, either individually or jointly? Must potential entrants be vertically integrated? Does the vertical restraint raise an entrant's costs significantly? Has the interconnection among network providers been mandated?

### **Step 7. Predatory behavior**

Predatory behaviors such as predatory pricing can be a part of strategic barriers that incumbents wield to deter the entry of new entrants. In particular, the predatory pricing refers to a strategy to set the price below the reasonable cost either to squeeze rivalry firms out of market or to deter the entry of potential competitors. If it were successful, the incumbent would be able to dominate the market and enjoy monopolistic pricing. Distinguishing predatory from normal competitive behavior is a subtle task and need not be attempted if the preconditions for rational predatory behavior are not satisfied. In particular, for predation to be rational a firm must be able to exercise significant market power post-exit (or merger) in order to recoup the losses (in foregone profits) incurred by the predatory behavior. Thus the first step is an analysis of market structure with a view to determining when predatory behavior could be a rational strategy. Relevant questions would include: What is the market share of the (alleged) predatory firm? What are the sizes of other firms in the industry? Are there any other important barriers to entry? Can the predator target price cuts where its rival is most vulnerable, and minimize its own foregone profits? If the preconditions for successful predation are not met, then enquiry in most cases need go no further.

### **Step 8. Assessment of entry impediments**

Entry impediments are any factors which delay the process of entry into a market without increasing the (sunk) costs of entry, or creating an asymmetry between incumbents and entrants. They are not entry barriers that afford persistent incumbent supernormal profits, but they may be important to antitrust decisions to allow a merger for example, because they influence the amount of time that incumbents may exercise market power before entry occurs. Good examples of entry impediments are licensing, certification or product registration requirements which involve little or no actual costs, but take significant amounts of time to satisfy. Other examples include the time required to obtain contracts (i.e. where the market's products are sold via long term contracts), set up production facilities, or gain a market share large enough to significantly influence the behavior of incumbents. However it should be noted that the distinction between entry barriers and entry impediments is not always sharp.

## **4. Analysis: The Broadband Market and Barriers to Entry**

### **Step 1. Market definition and production substituters**

In the U.S., broadband is defined as a service or facility with an upstream (customer-to-provider) and downstream (provider-to-customer) transmission speed of more than 200 kilobits per second (kbps). The FCC has used the term "high-speed" to describe services and facilities with over 200 kbps capability in at least one direction.<sup>5</sup> Even though the definition has often been criticized as not being able to incorporate real advanced features of current broadband technologies, the FCC has not responded to this voice yet (Turner, 2005). Thus, the broadband market will be defined a high-speed Internet service market with a rather moderate speed. Under the definition, every kind of access services must be included even though the speed is not enough for VOIP and video that require much faster bandwidth. A telecom research company

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<sup>5</sup> The FCC. (2002). *Inquiry concerning the deployment of advanced telecommunications capability* to all Americans in a reasonable and timely fashion and possible steps to accelerate such deployment pursuant to Section 706 of the Telecommunications Act of 1996. CC Docket No. 98-146 (February 6, 2002). Retrieved from [http://www.fcc.gov/Bureaus/Common\\_Carrier/Reports/fcc99005.txt](http://www.fcc.gov/Bureaus/Common_Carrier/Reports/fcc99005.txt) (Figliola, 2006).

reports that 42.8 million people subscribed for either cable or DSL broadband at the end of 2005, up 9.6 million from a year before. Also, it recognizes the new explosion of consumer-generated content such as MySpace pages and YouTube videos, and the demand for more bandwidth (Fox, 2006, March 22). Although only a few technologies, i.e., cable modem and xDSL have dominated the U.S. residential broadband market, the FCC has encouraged broadband deployment across multiple platforms based on different technologies as follows (Table 3). In particular, WiMax and fiber optic access technologies have been the most prospective of all in the near future.

In South Korea, the relevant market for the residential broadband service refers a market of the Internet access service of which download speed is more than 1 Mbps (MIC, 2002). This includes DSL, cable modem, B-WLL, Ethernet LAN, satellite Internet and so on. The analysis excluded Wireless LAN such as Wi-Fi and WiMax, IMT 2000, and PLC because of their low market penetration rate. A geographic market for the residential broadband in South Korea was defined as a whole nation because pricing and service quality of different platforms are very similar across districts.

The qualifying speed as broadband is very different between the U.S. and South Korea. Although the U.S. definition, i.e., at least 200 kbps in one direction can have effect to expand relevant market, the broadband content and applications markets have been limited by only accommodating the speed. However, the speedier access service in South Korea has been resulted from the effect of vigorous market competition rather than the government's requirement.

#### *Wireless residential broadband*

The notions of strategic groups and mobility barriers seem to work well in the wireless telephone industry. Also, it is found that market concentration and conglomeration are more prominent than vertical integration in this fast growing, segmented and competitive industry. The recent municipalities' efforts to deploy their own networks have been controversial but seem inevitable in that municipalities' initiatives attract incumbents rather than pits against them (Gibbons & Ruth, 2006). According to the industrial report (Gibbons & Ruth, 2006), there are low barriers to entry in the Wi-Fi access market. Relative ease of obtaining equipment, an unlicensed and free Wi-Fi spectrum, and relative availability of technical know-how have combined to act positively towards municipalities' deployment plans. Wi-Fi and WiMax

#### *Satellite*

Broadband satellite is a capital-intensive business. As its subscriber base grows, additional satellites should be launched. Robust margins are required to repay that capital investment. The business of satellite broadband is similar to EchoStar's DISH business. With 10 million customers, the company's profitability is based on how aggressively they are in the subscriber acquisition game. Satellite broadband will be similar to that but more profitable than satellite TV because broadband service does not require costs for contents. (Satellite News, 2004, Sep. 13). WildBlue, Strategic relationship with Liberty Media, provides high-speed Internet access via satellite to homes and small businesses in communities not currently served, or underserved, by other high speed providers.

#### *BPL*

Examining the overall regulatory issues of BPL, a Congressional report enunciates the advantages and disadvantages of BPL. First, BPL is less expensive to deploy than the cable and telephone companies' broadband offerings. Second, it does not require upgrades to the actual electric grid, and third, it is not limited by certain technical constraints of its competitors.

However, critics have expressed ongoing concern that BPL could interfere with licensed radio spectrum such as amateur radio, government, and emergency response frequencies.

### **Step 2. Market conditions and historical entry**

The Internet access (and its management service) market has been stagnant since 2000. And fierce competition among telecom operators led to tariff reduction and no charge for installation. As a result, despite an increase in subscribers that amount to 42.84 million, the sales revenue slipped by 8.5% to 822.5 billion won over the previous year in 2003. The sales revenue for ISP service have slightly grown 9.9% to 379.9 billion won in 2003 year-on-year (MIC, 2003).

SK telecom entered the residential broadband market in 2000 but exited in 2001 because it failed to obtain the subscribers enough to survive in the market. While in the market, SK telecom has a very limited market share, about 0.6% (44,346). On the other hand, in September 2005, PowerCom, a public utility company, entered the market. The entrance of system operators in small regions has been increasing. In June 2004, there are about 118 system operators. The significant number of the system operators has provided the residential high-speed Internet. Similarly with the U.S. case, the SOs have combined cable TV broadcasting and high speed Internet to provide a bundle service at cheaper price than what it would be without the bundle. Also, they have entered market in a certain area (surrounding SO franchise area) not on a national scale. Currently, the most prospective entrants are SOs and the main telecommunications network providers are not going to enter yet in a national scale. Since 2002, it is reported that certain providers have achieved marginal profits but in general, none of those has achieved super normal profits.

In South Korea, the residential broadband market has shown a high percentage of growth rate but it has been decreasing more recently. Since technological advances and service evolution have been much faster than other wired services, the competitive pressure has been much significant. Before any return on investment can be realized in a market, broadband service providers have to invest in other technologies. This might result in weaker competitiveness of providers with relatively weak finances. In South Korea, the advanced broadband infrastructure has referred to HFC or FTTH rather than ADSL, Wireless and satellite. First of all, ADSL technology has limited usage in having different speed of download and upload. So, wireless and satellite broadband in South Korea have not been much popular compared to ADSL or cable modem.

### **Step 3. Assessment of absolute (cost) advantages**

There exist no essential facilities in the broadband market in South Korea. Although the network in the last mile is an essential facility for DSL providers, there are many different alternative technologies such as cable, wireless, satellite and power line. In addition, considering Local loop unbundling (LLU), facilities provision rules, PowerCom's cable TV network for rent, there is no need to concern about essential facilities.

According to an amendment to the Telecommunications Business Act in 2002, Internet access service should be defined as a basic service, which requires admission or registration to provide the residential high-speed Internet service. Although new entrants should build up a certain scale of networks and obtain the license, this process of licensing is not necessarily an entry barrier, but makes the entrance timing might be delayed. A license does not invoke any additional sunk cost to a potential entrant but increases the necessary time for entrance. Value-added service providers do not have sunk cost because they have no networks and are required

only to register not to get a license.

While KT has shown in a bid of VDSL modem provider, KT has much superior negotiation power in supplies and appliances markets than other providers. This power let KT enjoy the absolute cost advantage. In a bid for 50 Mbps VDSL equipment supply, equipment manufacturers argued against price discounts because of raw materials price increase. Thus, KT, not equipment manufacturers, directly contacted the raw materials provider to get lower price (Digital Times, 2003, September 22). It is rare that the buyer of equipments has a price negotiation with law material providers. Thus, this case shows that KT has superior market power as an equipment buyer.

#### **Step 4. Sunk cost, economies of scale and capital requirements**

The necessary facilities required to provide the broadband service are routing facilities for exchange, transmission and last mile networks. If we define the sunk cost as in the U.S. Merger Guideline “are the acquisition costs of tangible or intangible assets that cannot be recovered through redeployment of these assets outside the relevant markets”, and determine the Internet service market as relevant market, the transmission and last mile facilities are able to be recycled in other services market. Thus, these are not sunk costs. However, routing facilities are sunk costs because they are not able to be recycled for other purposes except for the Internet access service itself. If the relevant market were limited to high-speed broadband market, routing facilities and equipments could be recycled in a narrowband Internet market. Thus, on this occasion, routing facilities and equipment are not sunk costs. However, considering that the narrowband Internet access market in South Korea has been rapidly fading and there has been no new investment in the narrowband market, the relevant market should be defined as Internet market.

##### *Economies of scale and economies of scope*

There exist both economies of scale and economies of scope because the presence of fixed costs enables average cost decreasing with increasing subscribers and at the same time, network operators could use the network for other various services. Unlike wireless phone industry, national coverage is not a necessary requirement for Internet access services, the limitation of service availability has been a disadvantage in competition. Network coverage could become a barrier to expand the business because of the advantage of occupying subscribers with its magnitude. Although absolute cost advantages of the incumbents exist resulted from economies of scale and scope for sure, their importance has been reducing because of dropping costs for service provision and development of niche markets thanks to technological innovation. Thuronet in July 1998, Hanaro in April 1999, KT in June 1999 started their businesses. Kim and Lee estimated the minimum viable scale of entry (MVS) of residential broadband market by using Stigler’s survival test and concluded that at about 25-30% of market size would be the MVS in Korean market. The capital required for entrance is an enormous amount. In particular, assuming that a new entrant cannot reap profit for a while, it would be bigger.

However, as for firms with economies of scope such as PowerComm and SOs, the required additive capital for entering the residential broadband market is not so much. Also, there are new entrants originated from non-telecom businesses that can ensure financial assets when entering the market. For example, Korea Electricity, Inc. owns poweline communications networks (PLC) through which provides the broadband access service.

#### **Step 5. Product differentiation, advertising, switching costs and network**

## **externalities**

It is well known that price and speed are more critical elements than the difference of access technologies for normal users to select a provider. Since most service providers offer services at similar price, speed and added services, product differentiation among providers rarely exists. According to some surveys conducted by KISDI in 2003 and in 2004, there was no difference among KT, Hanaro and Thurnet in terms of individual users' perceptions of the service satisfaction level.

### *Brand recognition*

In terms of brand recognition, KT among the dominant providers has shown the highest recognition rate in a survey in 2004 by recording 61%. This is a big difference compared to the second providers-as Hanaro Telecom recorded 26% recognition rate. Additionally, a logit regression analysis about reasons of selecting a service provider indicates brand name recognition has influenced the selection decision. For example, KT shows a positive and significant relationship between "the firm's brand name recognition and trust level while Hanaro and Thurnet showed negative but significant ones. Also, a favor level test showed the order of KT, Hanaro, Thurnet, Dacom, Onse and regional cable TV system operators (SOs) in terms of users' favor level.

### *Switching costs*

In case of switching a provider, the remnant contract time, subscription fee, replacement cost for equipment have been barriers to switch a provider on the customer side. Thus, service providers have offered subscription fee waive, free use for a limited time, and so on to get the number of subscribers. Given that modems have been standardized, switching costs of broadband service access have been minimal.

### *Network externalities*

Although Internet networks is open and interoperated networks, when the transmission volume is not enough at the interconnection point or the interconnection speed is not enough to result in confusion cost, to subscribe for networks with more subscribers is more advantageous in using advanced applications such as P2P, Web HardDisk and so on. As well, contents providers would be more advantageous to use networks with the greater number of subscribers. Therefore, both direct and indirect network externalities may exist.

## **Step 6. Vertical foreclosure and exclusion**

Since vertically integrated providers may preclude new entrants from entering market by refusing to provide the last mile networks or excluding a specific new entrant, the South Korean government has legislated LLU (Local Loop Unbundling) and facilities sharing rules. Thus, ensuring the relevant rules and legislations, to prevent new entrants from entering market has been difficult in South Korea.

## **Step 7. Predatory behavior**

When a firm wants to conduct predatory pricing in the market, it should have a certain degree of market power and financial ability. This is called as a theory of "long purse". After a competitive firm exit, the firm should be able to increase the price to recover the loss. There is a possibility that, if KT, a dominant provider, reduce the price below marginal cost or average cost for a certain period of time, it would obtain a significant share of market and make competitors exit.

Despite intended exits, however, KT would not increase the service price unless the

market comes to monopolize. The reasons are as followings: First, even though it may succeed in excluding new entrants or marginal competitors, to make the second or third companies exit would be difficult. It is possible that survivors from competition make KT harder to increase price by taking subscribers away from KT and make KT fail to raise profits even after price increase. Second, SOs have been increasing their market share by cheaper service surrounding certain areas (which are mostly their franchising areas). However, KT has responded with quality and service competition to this competitive pressure rather than price competition. Once KT competes with SOs in price, KT should bring down its own price. In this case, the whole profits KT can obtain would be diminishing although it could take subscribers away from SOs.

On the other hand, if KT competes in a certain area with quality, value-added services, and giveaways, KT may lure more new subscribers away without influencing the revenue derived from the existing customers. Considering the facts, we can assume that the incumbent provider would compete with quality and service rather than with price by conducting a predatory pricing. KT would have more incentive to raising rivals cost by increasing prices of transmission and land line for rent rather than predatory pricing.

### **Step 8. Assessment of entry impediments**

In the broadband access market of South Korea, only discernable barrier to entry was nothing but obtaining a license. In the residential broadband access market, if a new entrant is going to enter nationwide on a large scale, barriers to entry would be much higher to entrants without economies of scale compared to entrants with economies of scale. On the other hand, entry barriers would be rather low to an entrant that tries to enter on a small scale like value-added or special service providers that can lease facilities from the facilities-based operators.

### **5. Conclusion**

In summary, barriers to entry retain very diverse conceptions on their own depending on economists and scholars. Although the Stiglerian conception of entry barriers has been more precisely defined as focusing on cost differentials between entrants and incumbents, the Bainian approach will be more applicable for investigating barriers in the telecommunications market. Because, first, economies of scale, sunk costs, and advertising are critical sources of barriers to entry in the telecommunications network industry and second, they will be all excluded under the Stiglerian approach. How these barriers influence the entry decisions of new potential entrants has not been apparent. By empirical evidences from previous literature, we can assume that the barriers will vary depending on the scale of entrance, potential local demands, and specific characteristics of the market. Also, as far as there are incumbents with economies of scale and sunk costs, their responses to potential entrants will be erecting strategic barriers through advertising and service/quality competition rather than price reducing in the telecommunications market.

The Telecommunications Act of 1996 mandates that the FCC eliminate and identify market entry barriers “for entrepreneurs and other small businesses in the provision and ownership of telecommunications services and information services, or in the provision of parts or services to providers of telecommunications services and information services.”<sup>6</sup> Therefore, the Commission has a statutory duty and an obligation in the public interest to identify and eliminate market entry barriers for small telecommunications businesses affected in this

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<sup>6</sup> 47 U.S.C. § 257

proceeding. In general, the Commission has interpreted market entry barriers to include, inter alia, "barriers that impede entry into the telecommunications market by existing small businesses, and obstacles that small telecommunications businesses face in providing service or expanding within the telecommunications industry . . . ."

In particular, barriers to entry is a very important issue at the moment that the US has adopted non-open access rules in the advanced telecommunications networks which deliver high-speed Internet to the residence area and ruled out most non-facilities based providers with small scale. Even though wireless, satellite and other access technologies have been said as being able to overcome the last mile problems, they may have still faced entry barriers. The residential broadband market has been called as monopoly or at best, duopoly for a long time thanks to the enormous heights of entry barriers such as scale economies and sunk costs, which come from the burdensome underground wiring and essential facilities.

Generally, big companies can overcome certain barriers to entry more easily (e.g., economies of scale) and they may be able to influence the competitive positions in an industry to a greater extent than smaller companies can. Small companies are often the first and most directly affected by the harm caused by price fixers and market allocators or anticompetitive behavior of incumbents (Golodner, 2001). The size of the entry (in terms of new production capacity), thus, influences the consequences for the incumbent. Incumbents might allow small entrants or fringe companies in the market in order to keep bigger competitors out of the market. If an entrant enters with a large production capacity, it poses a serious threat to the incumbents. In such circumstances, incumbents are more likely to react aggressively to the entrant, for example by lowering their prices. Therefore, the size of the (potential) entrant is expected to influence the reaction of the incumbents. Barriers to entry have an effect on the entry decision of potential entrants as well. If the barriers to entry are too high, small firms or start-ups might decide not to enter the market. This might have a negative effect on competition and on the dynamics of the market, and might result in high prices and/or low quality and innovation.

A more recent study about Internet Service Providers (ISPs) (van Gorp, Maitland, & Hanekop, 2006) reveals the challenges ISPs face and their responsive strategies. By examining the Dutch broadband market and surveying European ISPs, it finds that ISPs' offerings of broadband services are more likely to be driven by competitive forces than by proactive strategies, although most ISPs started their role as a technological mediator in the market. Interestingly, they conclude that ISPs' position in the market is likely to be threatened by infrastructure providers when infrastructure providers come to be aware of the potential of Internet access and expand their service area. The market power of infrastructure providers will bring further competitive pressure on independent ISPs in broadband access market in the future.

Thus, this study raises a question, in increasing market competition, whether or not independent ISPs will be able to gain enough market shares in fixed Internet access services. The challenges ISPs face indicate the increasing importance of owning facilities or network infrastructure in the broadband age (Andy Ng, et al., 2004). Andy Ng, et al. (2004) studies the industry structure of the residential broadband market and argues that owning the optical last mile network is strategically important because of its monopolistic nature and the technical scalability to meet future bandwidth demand. As a result, the last mile operator will seize substantial market power in the broadband service value chain (Andy Ng, et al., 2004).

With the importance of network facilities in the telecommunications market, a doctrine of network sharing was dominant due to the large capital investments required for redundant access networks. However, for the last decade, unbundling mandates and interconnection rate regulation

were also criticized as harmful government regulations resulting in deterring the investment by the incumbent telephone companies in alternative broadband platforms. Since new entrants could enter into the broadband market by using the DSL providers' facilities, they did not have incentives to invest much in building up their own facilities and new access technologies (Hausman, 2002b; Yoo, 2004; Lent, 2004).

This argument, however, indicates the double edges of a sword. Due to the mandated unbundling, new ISPs were able to easily enter the narrowband market and to contribute to expanding alternatives to consumers (Cooper, 2004). When it comes to the broadband market, however, unbundling has been identified as a roadblock for both infrastructure owners and entrants without facilities to invest in new platform technologies. Without an unbundling mandate, new entrants without facilities would face a higher barrier, while new entrants with facilities generally would have incentives to invest in advanced access technologies. Thus, this raises a question: how is it different in terms of barriers to entry between entrants with facilities such as wireless, power line and satellite technologies, and entrants without facilities that need to lease facilities from DSL and cable network operators. And how will the abolition of the mandated unbundling rule impact entrants without facilities?

High degrees of entry barriers by high customer acquisition costs and the economies of scale in network operations in local telecommunications market would induce the strategy of buying or acquiring the existing telephone companies rather than building a new network to ascertain the difficulty from de nouveau entry. If there is an industry that firms can only enter if they make a large capital expenditure, a firm will not enter if the profits that it anticipates in the long run will not be sufficient to justify the initial capital requirement. Therefore, as shown in the transaction between GTE and CenturyTel in 1999, new entrants are often willing to pay the premium for the purchase of networks and customers (Gabel, 2002). Although new entrants with facilities such as wireless, powerline and satellite may come from the existing companies with deep pockets, to overcome barriers, e.g., enormous capital requirements, economies of scale and sunk costs of residential telecom networks would be not that much easy. Despite the market expansion of various broadband access technologies, it seems not clear whether new entrants with facilities gain post-entry profits enough to compete with incumbents in the residential broadband access market and how new entrants without facilities are ever going to enter the market without a way to access to residential users.

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