



**Mobile Virtual Network Operators**  
**Economic Assessment and Policy Framework**

Christian Dippon

Nigel Attenborough

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NERA Economic Consulting

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## **I. Introduction**

Mobile virtual network operators (MVNOs) are nonfacility-based wireless carriers that lease network capacity from facility-based carriers or mobile network operators (MNOs) and then resell wireless subscriptions using their own branding and valued-added services. MVNOs have entered the market in the U.S., the UK, and many other countries with voluntary, commercially negotiated wholesale contracts with a host MNO. This paper discusses why MVNOs have entered some economies but not others, whether such entry increases competition and consumer welfare, and what ex ante and ex post regulators should do, if anything, to encourage MVNO entry.

To answer these complex questions, we conducted three general analyses. First, to gain a thorough understanding of how MVNO entry occurred in different countries and to determine its impact on competition and consumer welfare, we studied MVNO entry in twelve different countries. This benchmarking study revealed a number of interesting findings and dispelled the common myth that MVNOs generate significant competition in the wireless sector.

Second, we designed an analytical framework by which the competitive conditions with respect to MVNO entry could be examined: whether a country's current lack of MVNOs was the result of market failure or simply a consequence of market forces and what degree of ex ante or ex post regulatory intervention was needed. In order to assess whether MVNO entry is economically profitable, we also studied possible business models for MVNOs and detailed short-run and long-run survival challenges.

Finally, we addressed the economic consequences of regulatory-mandated MVNO entry in economies where intervention could not be economically justified.

## A. Definition of an MVNO

A standard definition of an MVNO does not exist. The U.S. Federal Communications Commission (FCC) defines MVNOs as resellers that “purchase airtime from facilities-based providers and resell service to the public for profit.”<sup>1</sup> Under this definition, simple resellers that sell mobile services under an MNO’s brand name would be classified as MVNOs.

Industry analysts, on the other hand, define MVNOs as an arrangement where “a network operator acts as a wholesaler of airtime to another firm, which then markets itself to users just like an independent operator with its own network infrastructure.”<sup>2</sup> This definition distinguishes MVNOs from resellers because they add value, for example, brand appeal, distribution channels, and other items, such as different pricing options, to the resale of mobile services.

The UK regulator, Ofcom, probably offers the most general definition of an MVNO as “an organisation which provides mobile telephony services to its customers, but does not have allocation of spectrum.”<sup>3</sup> Like the FCC, Ofcom uses the terms “resellers” and “MVNOs” as synonyms, but Ofcom does not require that airtime be purchased from facilities-based providers, and it does not require that such service be sold at a profit.

Finally, the European Commission (EC) defines an MVNO as “a mobile operator, which does not have a license to use radio spectrum, but has access to the radio infrastructure of one or more mobile operators and is able to offer services to customers using that infrastructure and its

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<sup>1</sup> Before the Federal Communications Commission, In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services, Eleventh Report, 21FCC Rcd 10947 (2006) (“Eleventh Report”), ¶ 27.

<sup>2</sup> Tom Standage, “The Internet, Undeterred,” *The Economist*, October 11, 2001, p. 16.

<sup>3</sup> Office of Communications, “Annex F – Glossary, Statement on Wholesale Mobile Voice Call Termination consultation,” [http://www.ofcom.org.uk/consult/condocs/mobile\\_call\\_termination/wmvct/annexf/](http://www.ofcom.org.uk/consult/condocs/mobile_call_termination/wmvct/annexf/) (accessed May 1, 2007).

own network.”<sup>4</sup> The EC’s definition expands on the FCC’s and Ofcom’s definitions by adding that resellers must be partially facilities-based in order to be considered MVNOs.<sup>5</sup>

Unlike simple resellers of telecommunications services, such as long distance, local exchange, and mobile network services, MVNOs typically add value to the resale of mobile services. Most MVNOs do not own facilities, although some leading providers have their own mobile switching centers (MSCs) and service control points (SCPs).<sup>6</sup> Consequently, we base the definition of MVNOs for the purpose of this report on actual market observations and define MVNOs as: *Companies that buy network capacity from at least one mobile network operator in order to offer their own branded mobile subscriptions and value-added services.*

## **B. Historical Overview of MVNOs**

Historically, the MVNO business model originated around the same time in both the U.S. and Japan. In May 1996, TracFone Wireless, a subsidiary of América Móvil, launched its pay-as-you-go wireless service in the U.S., while at the same time Japan Communications Inc. (JCI) introduced the data MVNO business model to Japan.<sup>7</sup> The first MVNO in Europe was Virgin Mobile UK, which launched its mobile services in November 1999. Currently, over 50 MVNOs are in operation in the European Union (EU), serving a diverse set of customers and offering a range of voice and data services. Similarly, the mobile market in the U.S. offers customers a

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<sup>4</sup> European Commission, “Towards a New Framework for Electronic Communications infrastructure and associated services, The 1999 Communications Review,” 1999, [http://ec.europa.eu/comm/information\\_society/policy/telecom/review99/pdf/review\\_en.pdf](http://ec.europa.eu/comm/information_society/policy/telecom/review99/pdf/review_en.pdf) (accessed May 1, 2007).

<sup>5</sup> Interestingly though, in reporting the number of MVNOs in Europe, the EC seems to include pure resellers. See European Commission, “12th Report on the Implementation of the Telecommunications Regulatory Package – 2006,” Final Report 2006, March 29, 2007, p. 7.

<sup>6</sup> An MSC is a telephone switch, similar to a central office switch, which bridges a mobile telephone network with another telephone network—such as the public switched telephone network. An SCP is a database residing in a Signaling System 7 network that is queried to determine how a call should be handled (e.g., an SCP is consulted to provide the translation of an 800 number to an actual phone number and to bill the owner of the 800 number for the call).

choice of over 40 MVNOs.<sup>8</sup> According to the FCC, approximately 7 percent of all U.S. mobile subscribers were served by resellers, including MVNOs, and analysts find that the 15.1 million wireless subscribers (end of year 2006) served by resellers has increased by 1.6 million over the previous year.<sup>9</sup> The number of U.S. MVNOs is not likely to grow significantly over the foreseeable future as many of the existing MVNOs struggle to meet revenue and subscriber targets. In the last few years, a number of U.S. MVNOs have exited the market, including high-profile or high-promise players such as ESPN Mobile, Disney Mobile, Amp'd, Sonopsia, and Movida. Other carriers, particularly Virgin Mobile USA and Helio are considering merging.

The initial success stories of some MVNOs in the U.S. and the EU, however, have caused similar business models to emerge in other countries where MVNOs seek to offer new and innovative product and service offerings to customers.

### **C. Technical Considerations of MVNOs**

Fundamentally, there are no technical considerations for MVNOs as they operate on any network or network technology. Nevertheless, there are some technical issues that might impact an MVNO's service management, the availability of handsets and other devices, and its service offerings.

MVNO service management comprises customer enabling, customer service variation, customer assistance, and billing. In practice, an MVNO can do as much or as little of these as it wishes, subject to the willingness of the underlying operator to provide control access to these

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<sup>7</sup> Simple wireless resale has been around for much longer than this and, using a broader definition of MVNOs, one could argue that the simple reseller of the early 1980s brought about the MVNO trends we observe today.

<sup>8</sup> Due to the constant entry and exit of MVNOs and the increased blurring between what constitutes an MVNO, a mobile virtual network enabler (MVNE), and a simple reseller, these numbers are approximations only.

<sup>9</sup> Before the Federal Communications Commission, In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Twelfth Report*, rel Feb. 4, 2008, ¶ 21..

functions. In selecting a host MNO, an MVNO will consider both the accessibility of the host MNO's service management system, as well as the MNO's reputation in this area. For instance, an MVNO's commercial success will be negatively impacted if it selects an MNO with an inferior market reputation in terms of service management.

A significant selling point of mobile services is the range and type of handsets offered. Thus, an MVNO might want to consider selecting a host network technology that is generally supported in the country it wishes to operate. For instance, GSM dominates much of Europe's markets and might be the prudent choice for an European MVNO. In the U.S. or South Korea, on the other hand, CDMA handsets are widely available and could offer an additional technical alternative to an MVNO in these countries.

Finally, in considering the various technical aspects, an MVNO must carefully select the desired network technology. Depending on the type of service offered and the level of competition in the marketplace, an MVNO might want to select a GSM, CDMA, or iDen network. For instance, if push-to-talk is important to the MVNO's strategy, iDen might be the preferred network. Alternatively, if one technology is least represented in a market, an MVNO might be able to negotiate more favorable wholesale access deals.

#### **D. MVNO Integration**

At a minimum, the launch and operation of an MVNO requires (1) a wholesale agreement with an MNO, (2) start-up capital, and (3) capital to cover operational expenditures and consumer acquisition costs. It is estimated that it takes, on average, US\$25–US\$50 million and two years to launch an MVNO.<sup>10</sup>

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<sup>10</sup> Roger Entner, "Entering the Wireless Market – What you need to Know to Launch and Operate Your own Wireless Business, Ovuum 2006," p. 5.

Critical to the launch of an MVNO is the negotiation and maintenance of a wholesale agreement. Furthermore, if the MVNO decides to manage all aspects of its own business, it typically has to purchase a customer-relation software application, a data platform, and billing software. Alternatively, an MVNO can outsource the operational aspects of its business to third parties, so called mobile virtual network enablers (“MVNEs”).

### **E. MVNO Operational Components**

The main operational components of the MVNO model consist of (1) the access network, (2) the core network, (3) the service platform, (4) pricing and billing, (5) customer care, and (6) marketing and sales. The access network consists of the base stations and transceiver equipment that provides access to the spectrum. Because MVNOs do not have spectrum licenses, they are required to use the access network of at least one MNO. Typically, MVNOs have access network agreements with one or two MNOs, although a few MVNOs (such as TracFone in the U.S.) have many such agreements.

The core network consists of switching and transmission, home location registers, Intelligent Network platforms, and so on. The service platform covers the activities and equipment used in the design and provision of services, while billing and pricing implement the pricing policies and billing options. Customer care encompasses all activities relating to after-sale customer care, and marketing and sales includes product and service marketing activities, sales operations, and customer acquisition activities.

MVNOs can self-supply all the operational components listed above (with the exception of the access network). For instance, France’s MVNO Tele2 is known as an “extended MVNO” as it purchases only the access network from an MNO. The choice of the actual MVNO type depends on a variety of factors, for example, the amount of investment that MVNOs undertake

and their possession of network elements from other telecommunications businesses, such as sites, leased lines, or billing systems that could also be used in the provision of mobile services.

Accordingly, MVNOs can be categorized as follows:

*Full or Extended MVNOs* operate a core network that is comprised, at a minimum, of a mobile switching center and possibly a transmission network, home location registers, an Intelligent Network platform, and other network components. Full MVNOs have more independence and greater control over costs, traffic, and subscriber services. On the other hand, they are the most risky type of MVNO because they require relatively large amounts of investment. Full MVNOs cover the whole value chain except for the access network.

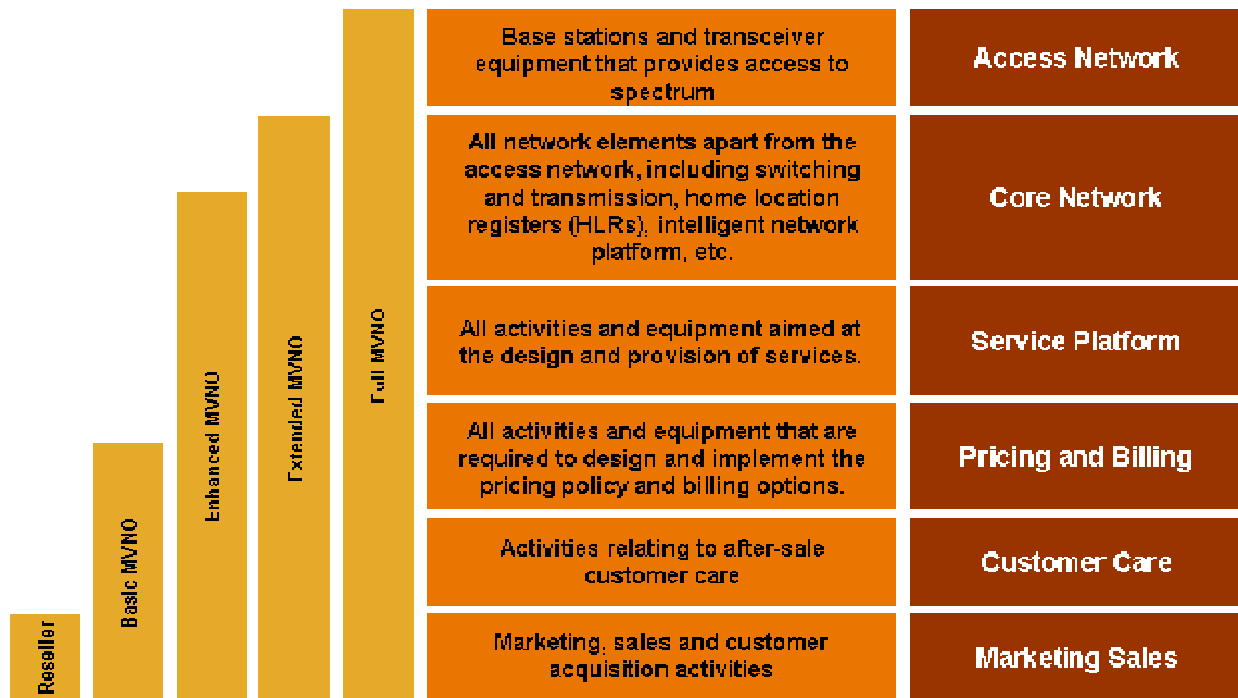
*Enhanced MVNOs* are different from full MVNOs (they do not provide all the network elements) and from basic MVNOs (they resell the MNOs' services but provide additional value-added services).

*Basic MVNOs* typically do not own network elements, but restrict themselves to customer-care operations, marketing and sales activities, and elements of pricing and billing.

*Pure Resellers* do not offer customer care, but simply provide marketing and sales functions to the MNO for a commission. As discussed above, we do not consider pure resellers to be MVNOs.

The network and operational components associated with the different types of MVNOs are summarized in Figure 1 below.

**Figure 1  
MVNO Operational Components**



## F. MVNO Business Models

MVNOs can expect to generate revenues and profits by targeting unserved market segments and adding value in the form of brand appeal, distribution channels, and other items to the resale of mobile services. In the U.S., in contrast to services offered by most MNOs, MVNOs focus mostly on the prepaid market segment, providing conveniently priced services that do not involve long-term contracts, credit checks, or early termination fees. Moreover, prepaid services are not subject to regulatory surcharges or additional fees for activation, E911, and mobile number portability.<sup>11</sup> Most MVNOs also add innovative nonvoice services, such as unique ring tones and games, to their service offerings. MVNOs in the U.S. largely redefined the prepaid market segment and enjoyed initial success in the process.

<sup>11</sup> Enhanced 911 (or E911) is an FCC program that requires wireless carriers to provide automatic number identification and location information for cell phone users that dial 911 emergency services. The fees associated

In Europe (in particular, the member states of the EU), the early success of prepaid services and the relatively quick adoption of mobile services caused mobile penetration rates to rise dramatically over the last decade.<sup>12</sup> As a result, European MVNOs (unlike their U.S. counterparts) faced a market where prepaid services were already well established, and consequently they tended to focus on adding value by offering data features, such as text messaging, ring tones, games, and music downloads.

Brand appeal is one of the major components of an MVNO's business model. As stated by Virgin Mobile CEO Tom Alexander:

If you could put the spirit that exists throughout the whole of the Virgin Group into bottles to sell, you'd be a multimillionaire .... The brand is also our biggest asset because it symbolises the great customer experience that Virgin stands for [sic].<sup>13</sup>

In addition to capitalizing on brand appeal, MVNOs generate revenues and profits by selecting appropriate corporate structures and strategic partners. For instance, in its UK operations, Virgin Mobile formed a 50-percent-owned joint venture between the Virgin Group and MNO T-Mobile. Virgin finds it "vital to have an agreement that is beneficial to both parties."<sup>14</sup> As further elaborated by CEO Alexander:

There is a network operator fear that MVNOs are going to steal a slice of their customer base and openly compete with them but what we actually do is provide T-Mobile with greater channels to market under another brand name, while the Virgin Group obtains an already built network.<sup>15</sup>

Other business models involve MVNOs having more control over their own fate. As described above, MVNOs can opt to become full or extended MVNOs. While this requires more start-up

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with this program are recovered via a user charge. MVNOs are exempted from charging this mandatory recovery fee to their users.

<sup>12</sup> In October 2006, penetration rates exceeded 100 percent in 17 out the 25 EU member states.

<sup>13</sup> Matthew Secker, "The Right MVNO Cocktail? – View from the Top," *Telecommunications International*, May 2002.

<sup>14</sup> Ibid.

capital, it provides companies with more leverage to compete in the long run. Essentially, for each type of MVNO listed above, there exists a business model. In addition, each of these general types of business models can be customized in many different ways—yielding a great many MVNO business models. For instance, in developing their business model, MVNOs must not ignore the importance of revenue management and billing systems. Whether to outsource such functions or keep them in-house along with determining which systems to select are strategic decisions that can affect an MVNO’s growth and profitability. Other aspects of a sound business model include flexible pricing, multiple payment options, revenue sharing with MNOs, and the total cost of ownership. In addition, MVNOs frequently offer customers simplified prepaid service plans marked by the absence of long-term obligations or contracts, early termination fees, monthly bills, credit checks, deposits, age limits, activation costs, and other hidden costs. MVNOs offer lower prices to low-income customers, thus giving them more control over how much they spend on telecommunications.

### **1. Classification of MVNO business models**

In general, MVNO business models can be grouped into four (nonexclusive) categories: facilities based, target market, strategy based, and plan based. In the facilities-based grouping, MVNO business models range from partial facilities-based models (full or extended MVNO) to models where the MVNO does not own any network facilities and is a pure reseller. As discussed above, extended MVNOs enjoy the most control over their costs and have the largest competitive leverage in the long run. MVNOs operating as pure resellers, on the other hand, have no intrinsic advantages and are least likely to survive in the long run.

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<sup>15</sup> Ibid.

The target-market-based grouping also has two general models: those that operate as discount MVNOs and those that serve lifestyle-based niche-market segments. For instance, U.S. MVNO TracFone is a no-frills discount carrier, targeting lower-income households. On the other side of the spectrum is Voce Mobile, which targets high-end users with plenty of disposable income. Voce offers exclusive designs and services to a wealthy, image-conscious clientele. After an initial registration fee of \$500, Voce charges \$200 per month for unlimited national usage and provides a new handset every twelve months.<sup>16</sup>

The long-run sustainability of a pure, discount-based strategy is doubtful because, in the face of intensifying mobile (in particular, prepaid) competition, merely offering low prices without some form of product differentiation, brand value, or cost advantage could prove to be a losing proposition. In contrast, lifestyle MVNOs target specific niche-market demographics and differentiate their services from those offered by their competitors. By adding value for members of the niche-market segments that they serve, these MVNOs are more likely to remain viable in the long run.

The strategy-based grouping categorizes MVNOs according to their specific strategies. This grouping is open ended, as MVNOs' strategies can vary widely. For example, we have (1) low-cost international MVNOs, (2) brand-extension MVNOs, (3) subprime-credit MVNOs, (4) youth-focused MVNOs, and (5) network-carrier MVNOs.<sup>17</sup> Again, the ultimate purpose of the different strategies is product differentiation and market segmentation.

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<sup>16</sup> Initially, Voce charged \$1,500 and \$500 per month for unlimited use and a free handset upgrade every four months. The prices above reflect Voce's current offerings. See <http://www.voce.com/main.html>.

<sup>17</sup> Subprime credit refers to those with a credit history of late or missed payments. Frequently, MNOs check a new subscriber's credit history before activating his account in an effort to make sure that the subscriber has the financial resources to pay for the plan's monthly recurring costs. If a subscriber's credit history is subprime, an MNO might refuse to provide service to him.

Finally, the plan-based grouping distinguishes MVNOs according to whether they offer prepaid or postpaid service plans. In the U.S., MVNOs that serve the prepaid market segment presently possess a comparative advantage, although their long-term prospects are uncertain. However, in countries where the prepaid segment is already at or near saturation and overall mobile market penetration rates are high that comparative advantage may not exist.

## **2. Challenges facing MVNOs**

Regardless of the business model selected, MVNOs must overcome challenges in order to survive in a competitive market. One challenge comes from their long-term dependency on, and relationship with, MNOs. Securing, negotiating, and maintaining wholesale contracts that are consistent with financial viability may not be easy. Even after negotiating such contracts, it can be challenging for MVNOs to capture and retain enough market share if their host MNOs or other MVNOs decide to focus on the same market segment as they do. A case in point is the market niche for “tween” mobile users.

Historically, U.S. MNOs did not specifically target the market for children between the ages of 8 and 12 (tweens). In March 2005, Firefly Mobile, an MVNO doing business with AT&T (formerly Cingular) on a wholesale basis, launched services and handsets geared toward tweens. Firefly’s tween-focused services, which are sold by AT&T, Alltel, and T-Mobile, are based on a simple pricing plan, \$0.25 per minute for all domestic calls. Firefly’s handset has speed dialing for parents, easy access to emergency services, and optionally rejects all phone calls from numbers not stored in the handset’s phone book. Firefly prices its starter kit (handset, charger, clip, and 30 minutes of airtime) at \$99.99. Only two years after Firefly went after this market segment, MNOs, MVNOs, and MNO/MVNO joint ventures, including LG Migo (offered by Verizon Wireless), TicTalk (offered by MVNO Enfora), and Kickflip (offered by MVNO Helio)

began targeting the tween market segment. This is not surprising as economic theory suggests that in a competitive market short-term monopoly rents in a market segment will quickly be eroded.

Another challenge for MVNOs is being able to capitalize on their brand reputations from outside telecommunications to identify or develop profitable niche-market segments within telecommunications. For instance, in Autumn 2006, Walt Disney Company announced that it was shutting down its mobile ESPN wireless telephone service, an MVNO that had been launched with much fanfare and high expectations during the Super Bowl game just eight months earlier. ESPN Mobile is a prime example of an MVNO that was not able to capitalize quickly enough on its brand reputation from outside telecommunications (i.e., sports entertainment).

A common problem for MVNOs, particularly in highly penetrated or saturated markets, is the lack of economies of scale, relative to the incumbent facilities-based MNOs. Long-term survival in these circumstances depends crucially on a value proposition that starts with being able to identify or develop the most profitable niche markets. Only then can an MVNO expect to produce sufficient revenues to remain in business until it achieves economies of scale.

While not unique to MVNOs, mobile carriers that follow a niche strategy must constantly adapt their strategies to the changing needs of their target markets. MVNOs frequently introduce new and innovative services in order to differentiate themselves from their competitors, including the large, national MNOs. To do this, they must develop innovative business models and service offerings that are targeted to specific demographic groups and underserved consumer segments. However, as niche services become mainstream ones and the early advantages of product differentiation are dissipated, MVNOs must continually introduce new features and

services in order to stay ahead of the game.

Perhaps the greatest survival challenge for MVNOs—and a source of new opportunities as well—is the ongoing process of convergence and intermodal competition in the expanded communications industry (involving fixed and mobile telecommunications, data transmission and storage, and multimedia and entertainment). The ability to offer a combination of voice, video, and data (or the “triple play”) over any one of several alternative platforms has become the aspiration of traditional networks and service providers and even MVNOs. With convergence, MVNOs are likely to face stiff competition from outside the mobile sector as well, particularly from cable and fixed providers that offer converged service offerings. However, convergence can also work to the MVNOs’ advantage in certain strategic relationships—best exemplified by the “Bluephone” product developed by BT (a fixed-service provider) and Vodafone (an MNO). Bluephone is a converged handset that connects via Bluetooth technology inside the home, but operates as a cellular device outside. In effect, outside the home, this makes BT an MVNO that uses Vodafone’s backbone facilities. As similar converged services are introduced in communications markets, fixed- and cable-service providers will likely seek opportunities to become MVNOs themselves in order to increase further the demand for such services.

## **II. Review of the Activity and Impact of MVNO Players Worldwide**

In order to understand the market characteristics conducive to MVNO entry, we studied the introduction and activity of MVNO players in a number of benchmark countries. Specifically, we examined MVNO activity in the U.S., UK, Hong Kong, Ireland, France, Denmark, Spain, Japan, South Korea, Jordan, Norway, and Canada. In each country, the following metrics were

reviewed:

- Available technological infrastructure
- Degree of fragmentation
- General competitive conditions (competitive, oligopolistic, monopolistic)
- National MVNO policy (level and kind of pro-MVNO regulatory intervention, rationale, and impact)
- MVNO entry (current and forecasted market shares of MVNOs)
- Pricing trends before and after MVNO entry

Not entirely surprising, the study revealed that competitive conditions, consumer demand, technological progress, and approaches to regulatory intervention in each country were rather different. Hence, there appears to be no one correct way of approaching the question of how to encourage MVNO entry into a country's wireless sector. Nevertheless, there are a number of commonalities among the benchmark countries that provide valuable lessons for operators and regulators.

Lesson 1: All benchmark countries have at least one MVNO providing service, although it is too early to conclude that they all will be able to survive.

Lesson 2: MVNOs tend to serve previously unserved market segments rather than competing with MNOs, and they deepen and widen the market.

Lesson 3: MVNOs appear in both fragmented and unfragmented wireless markets.

Lesson 4: Typically two to three MVNOs serve the majority of MVNO subscribers.

Lesson 5: Independent MVNOs serve less than 10 percent of the wireless market, and forecasts place combined MVNO market shares at less than 20 percent.

Lesson 6: There are few established 3G MVNOs because all larger MVNOs are 2G providers.

Lesson 7: Generally, national regulatory agencies have not intervened in MNO-MVNO relationships with two notable exceptions—Spain and Hong Kong (in the case of 3G). The decision in Spain is currently under appeal; moreover, in Hong Kong, regulation produced no MVNO entry and the regulator is currently considering lifting all MVNO-related regulation. Other countries that have intervened in the MNO-MVNO relationship include Jordan, Slovenia, and Japan.

Lesson 8: Most regulators have maintained a “watchdog” position; that is, they are carefully continuing to monitor the interactions between MNOs and MVNOs.

Lesson 9: Regulators’ decisions to intervene are typically based on a competitive review of the relevant market. The guiding principle is market failure, as observed through market power or anticompetitive behavior.

Lesson 10: Generally, regulation has not directly led to MVNO entry, although threats of regulation might have encouraged MNOs to negotiate with potential MVNOs, with the exception being Spain.

Lesson 11: Most MVNO business models are built on brand appeal, niche market targeting, existing distribution channels, discount offerings, and prepaid plans and are complementing, rather than competing with, the MNOs offerings.

Lesson 12: Most MVNOs are competitive tools used by MNOs rather than competitors of MNOs.

Lesson 13: The consumer-welfare impact of MVNOs is in extended and innovative service offerings and not in lower prices.

Lesson 14: The most successful MVNOs are frequently acquired by MNOs.

### **III. Analytical Framework for Regulatory Intervention**

How can regulators assess whether MVNO-related regulation in their country is economically justified. In order to answer this question, one must examine indicators of the level of competition, potential competition, and entry conditions in the country’s wireless market.

Specifically, the regulator must examine the market for signs of market failure with respect to MVNO entry. Market failure prevents competitive forces from working properly. Therefore, if the economic analysis reveals sufficiently competitive market conditions to alleviate concerns of market failure in the face of entry by MVNOs, then regulation becomes at best superfluous and at worst counterproductive. If not, then regulation might be required.

#### **A. Examining the Competitive Conditions in the Mobile Market**

MVNOs interact with MNOs at the wholesale level. Therefore, ideally one would examine

competition in the provision of wholesale network access. However, since there are frequently no MNO-MVNO wholesale agreements in an economy considering MVNO-related regulation, it is necessary to rely on retail competition instead. Retail competition is generally regarded as a suitable proxy for wholesale competition, as it is unlikely that there will be no wholesale competition if the carriers compete in the retail market. Similarly, it is unlikely that there will be wholesale competition if there is no retail competition. Moreover, this methodology is consistent with the approach adopted in a number of countries, such as Spain and Ireland, where the need for MVNO-related regulation, absent the presence of MVNOs, was assessed by the regulators.

### **1. Market definition**

Competition occurs within a market; supply and demand conditions within a market dictate prices; and the public interest is easier to evaluate when viewed as the welfare of all consumers within a market. Hence, regulators must conduct their analyses in the context of a market.<sup>18</sup>

### **2. Analysis of the level of competitiveness of the retail market**

Consistent with economic theory and the practices employed by the National Regulatory Authorities (NRAs) in the benchmark countries, regulators must evaluate the level of competition of their wireless retail markets by assessing the risk of market failure with respect to MVNO entry. Specifically, NRAs must examine the retail market for signs of market failure in the form of market power or anticompetitive behavior. The European Court of Justice defines market power, or market dominance, as:

... a position of economic strength enjoyed by an undertaking which enables it to prevent effective competition being maintained on the relevant market by

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<sup>18</sup> For a discussion of market definition, see Christian Dippon, "Size Matters: Relevant Market Definition and Competition Review in a World of Intermodal Competition," published in *K&L Gates-NERA Global Telecom Review, 2008 Edition*, March 2008, p. 1.

affording it the power to behave to an appreciable extent independently of its competitors, customers and ultimately of its consumers.<sup>19</sup>

As outlined above, the EC's guidelines state that "a dominant position is found by reference to a number of criteria and its assessment is based ... on a forward-looking market analysis based on existing market conditions."<sup>20</sup> Hence, competitive conditions in an economy can be assessed by analyzing:

- Market shares and market-share trends
- Barriers to entry and expansion
- Pricing and profitability
- Coordination incentives and abilities
- Historical behavior
- Market contestability

When applicable, it is informative to benchmark the country-specific findings against those in the countries discussed above.

### **3. Market shares and market-share trends**

Market shares and market-share trends are an integral part of a competitive assessment as concerns regarding potential market failure are more pronounced where there are only a few firms in the market, or where one or some firms have very large market shares, thus making it difficult for smaller firms to compete. For instance, as held by the European Court of Justice:

... very large market shares are in themselves, and save in exceptional circumstances, evidence of the existence of a dominant position. An undertaking which has a very large market share and holds it for some time ... is by virtue of that share in a position of strength.<sup>21</sup>

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<sup>19</sup> European Court of Justice, *United Brands v. Commission*, Case 27/76, 1978, ECR 207.

<sup>20</sup> *Ibid.*

<sup>21</sup> European Court of Justice, *Hoffman-La Roche v. Commission*, Case 85/76 1979, ECR 461, ¶ 41.

While we do not entirely agree with the absoluteness of this statement, particularly for regulated industries, we do agree that market share and market-share trends are a relevant part of a rigorous competition review. This view is consistent with the EC's guidelines, which pay particular attention to market share, yet correctly stress that a large market share alone is not sufficient to establish market dominance.<sup>22</sup> Market concentration, as measured by the Herfindahl-Hirschman Index (HHI) must also carefully be examined and benchmarked against other countries. Analyst reports and data vendors frequently track market concentration in a number of countries and thus the analysis is rather straightforward.

Regarding market share trends, the EC states that an operator with a large market share may be presumed to have significant market power (SMP) if its market share has remained stable over time.<sup>23</sup> If its market share is gradually eroding, this may indicate that the market is becoming more competitive, although that fact alone does not necessarily preclude an SMP finding. On the other hand, fluctuating market shares over time may indicate a lack of SMP in the relevant market.<sup>24</sup>

#### **4. Pricing and Profitability**

Pricing and profitability levels are commonly used in evaluating the level of competition in an industry. In the case of MVNOs, the UK regulator, Ofcom, decided against regulation due in part to significant asymmetries in profitability. Prices and profitability levels also played an important role in Ireland and Spain, where regulators justified their regulation proposals in part due to the

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<sup>22</sup> The limited use of market-share analysis to determine market power has also been adopted by the U.S. Federal Trade Commission and the U.S. Department of Justice. Market share analyses can be useful screens to determine whether there is potential market power. However, they should not be seen as being dispositive on market power and can, at times, be highly misleading indicators of market power.

<sup>23</sup> EC Guidelines on Market Analysis, ¶ 75.

<sup>24</sup> Ibid. Fluctuating market share may be empirical evidence of a contestable market. Given the relentless lowering of barriers to entry and exit (through VoIP or other emerging technologies), certain communications markets have become contestable and, thus, lack market power.

high profitability of MNOs. The rationale for examining prices and profitability is simple: high prices and high profitability might be indicative of supracompetitive prices and excessive returns (i.e., monopoly rents). This in turn might be evidence of market failure.

To examine retail prices, NRAs can benchmark the average voice revenue-per-minute (RPM) against other countries for which RPM data are available.<sup>25</sup> It is also useful to examine pricing trends and benchmark it against the trends in other countries.

The UK regulator, Ofcom, cited significant differences in the profitability of different operators when reaching its conclusion that the UK retail wireless market was competitive. Similarly, when declaring Vodafone and O2 as having joint SMP, Irish regulator ComReg cited the high profitability of the two MNOs and pointed to the companies' respective 39 percent and 38 percent rates of return on capital employed (ROCE). In Spain, profitability also played a key role in the decision to implement wireless access regulation, as CMT found high profitability, measured by EBITDA and ROCE, for all three MNOs, with ROCE greatly exceeding the weighted average cost of capital (WACC).<sup>26</sup>

The WACC is generally used to calculate the overall cost of a company's financing. It is calculated as the average of the interest rate on the company's debt and the required rate of return on the company's equity. The WACC is calculated taking into account the respective proportion of debt and equity in the company's capital structure. The WACC, therefore, is somewhere within the range between the company's cost of debt and its cost of equity. It represents the capital market's overall assessment of the rate of return that should be earned by the company to cover the time value of money and the risk premium. The WACC is

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<sup>25</sup> The RPM is calculated by dividing monthly voice-only ARPU by monthly minutes of use (MOU).

<sup>26</sup> European Commission, "Case ES/2005/0330: Access and Call Origination on Public Mobile Telephone Networks in Spain, Comments pursuant to Article 7(3) of Directive 2002/21/EC," January 30, 2006.

predominantly used by economists and financial experts when undertaking evaluations of a project's profitability and is frequently discussed in the economic and financial literature.<sup>27</sup>

The reason for focusing on profitability is straightforward—high and stable profitability could be indicative of a noncompetitive market and could be an incentive for MNOs to maintain high prices and deny access to MVNOs and resellers.

## **5. Barriers to entry and expansion**

Market entry barriers refer to asymmetries between incumbent firms and new entrants that make it more costly or harder for the latter to compete. A frequently cited entry barrier to the wireless market is the lack of spectrum. For instance, as described above, one of the reasons OFTA required wholesale 3G services to be offered separately from retail 3G services in Hong Kong was the limited availability of spectrum. OFTA found that the lack of spectrum was a barrier to entry for potential competitors. Hence, it implemented regulatory measures to reduce potential market entry barriers with the hope that increased entry would lead to increased competition.

Barriers to expansion refer to situations where a company has already entered the market but faces obstacles in expanding its market share. The costs of customers switching providers (switching costs) is a frequently cited barrier to expansion and refers to situations where subscribers are tied, financially or otherwise, to their existing provider and cannot take advantage of special service offerings or price promotions by competitive service providers.

While the existence of entry and expansion barriers does not necessarily preclude competition, if the barriers are low, competition is enhanced. This, in turn, can benefit consumers as the incumbent operator(s) cannot sustain supra-competitive prices in the long run when

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<sup>27</sup> For example, a leading economic finance textbook, *Principles of Corporate Finance*, by Richard A. Brealey and Steward C. Myers (McGraw-Hill Companies; 5th edition, July 1996), dedicates an entire chapter to explaining this use of the WACC.

competitors can easily enter the market. On the other hand, if entry or expansion barriers are high, firms with a large market share are more likely to be able to maintain their share over time and possibly sustain prices above competitive levels.

As we discuss below, however, high entry and/or expansion barriers alone do not guarantee that incumbent players can charge supracompetitive prices. Rather, other factors, such as the number of incumbent players, countervailing buying power, and regulatory barriers contribute to the level of competition in a given market. Below, we discuss a variety of entry barriers that are frequently encountered in both developed and underdeveloped nations.

### ***Spectrum availability***

Wireless spectrum, in particular spectrum for 2G and 3G services, is a scarce resource. In most countries, the number of parties seeking a license for spectrum far exceeds the number of operators that can be supported by the available blocks of spectrum. Governments around the world have dealt with this issue using different allocation methods. Some countries resorted to auctions, allocating the available spectrum blocks to the highest bidders. For instance, Germany's 3G auction raised approximately US\$46 billion, while the UK regulator sold its five 3G licenses at approximately US\$36 billion.<sup>28</sup> Other countries allocated their spectrum blocks using the "beauty contest" method where only companies that met the regulators' definition of "beauty" (typically an appropriate business plan, attractive service offerings, financial soundness, etc.) received a spectrum license. Some countries sold their spectrum to interested parties without any particular allocation method, and others used some sort of hybrid version. Regardless of the allocation method, companies that did not obtain a spectrum license face a

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<sup>28</sup> Sag Harbor Group, "Reflex Rules, The Role of Pervasive Low-Cost Networks and Devices in the Future of Mobile Data Messaging," 2001, p. 42.

significant barrier to entry. That is, without a spectrum license, they cannot enter as a facilities-based competitor.

Ofcom, in its competitive assessment of the UK wireless market, found that there were significant barriers to entry at the wholesale level due to limited spectrum and high sunk costs. In France, ART concluded that competitive entry was unlikely due to the lack of spectrum, and in Denmark the regulator concluded that such a barrier did not exist as there was one additional license available for a new entrant.

### ***Regulatory approval***

Many regulators require mobile carriers to be licensed as wireless service providers. Depending on the requirements and process specified by the regulator, obtaining regulatory approval can be lengthy and expensive. Some governments, such as Spain, have attempted to remedy this potential entry barrier by creating special licenses for MVNOs (the A2 license) and then ultimately entirely waiving such a requirement.

Another source of potential regulatory barriers stems from local government jurisdiction over rights-of-way and the location of cellular antennas and towers. Given the increasing health concern associated with wireless infrastructure, obtaining site and right-of-way approvals from local governments can represent a significant barrier of entry.

### ***Access to capital markets***

Access to capital markets and financial resources can present a barrier to entry and expansion, particularly for new MNOs that cannot secure sufficient funding.

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

A common problem faced by new MNOs, particularly in highly penetrated or saturated markets where it is not possible to pick up a share of an expanding market, is the initial lack of scale that

puts them at a cost disadvantage relative to the incumbent MNOs. The problem is especially pronounced for MNOs who have to incur significant sunk costs upfront and cannot enjoy any economies of scale in the short run.

### ***Switching barriers***

If customers are reluctant or unable to switch wireless providers due to certain characteristics of the incumbent MNOs' offerings, this would make it harder for competing carriers to enter the market or expand their market share. Consequently, switching barriers (costs) can be a competitive constraint. A switching barrier is particularly troublesome for competitors if the customers that are less likely to switch are those customers who represent low default risk.

Switching costs are prevalent throughout most economies (e.g., health clubs, airline and hotel loyalty programs, credit cards, etc.) and are typically not subject to regulation.

Accordingly, there is an abundance of economic literature that addresses whether the resulting "lock-ins" represent a market failure that requires government intervention.<sup>29</sup> During the U.S. regulator's proceeding on mobile number portability (MNP) in 2002, switching costs and their relation to market failure was a central issue in the discussion. In this proceeding, economist Dr. Hal R. Varian stated:

Switching costs in a competitive market do not inevitably harm customers. In fact, the higher the switching cost, the greater the inducement a competitor will likely offer to acquire a new customer. For example, in the wireless context, such inducements could take the form of free or subsidized handsets. If switching costs are eliminated, competitors will have less incentive to offer up-front sweeteners to acquire customers.<sup>30</sup>

Dr. Varian based his findings on the economic argument that "lock-in" effects can be managed by consumers prior to being locked in because they predict and extract upfront payments

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<sup>29</sup> See, generally, Carl Shapiro and Hal R. Varian, *Information Rules: a Strategic Guide to the Network Economy* (Harvard Business School Press: 1998).

(“sweeteners”) whose value equals the switching costs. We agree with Dr. Varian’s statement that the mere existence of a switching barrier does not mean that there is market failure. As long as the market is competitive, a switching barrier follows the classic “bargain then rip-off” cycle. Thus, in determining if switching barriers are present in the wireless market, it is important to recognize that if they exist, they should be evaluated in the context of the overall level of competition.

In wireless telephony, switching barriers can take various forms, including:

- Term contracts
- SIM/handset locking
- Lack of mobile number portability
- Opaque pricing plans
- Product bundles

### *Churn Rates*

Churn rates measure customer turnover and are typically expressed as the rate of disconnections per month. For instance, a 3 percent monthly churn rate implies that 3 percent of the average customer base for the specific month disconnected its services. Churn rates are most useful as business metrics, providing individual companies with information on the impact of price changes (price elasticity) and quality of service changes, the intensity of competition, and the average “lifespan” of a customer. High average churn rates in a market are sometimes also associated with strong competition, while low average churn rates usually indicate less competition. From an economic viewpoint, the correlation between churn rates and competition is not necessarily clear. For instance, high average churn rates for the wireless market might be caused by one carrier’s inferior quality of service and thus might not be a testament to the level

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<sup>30</sup> Letter from Hal R. Varian to Magalie Roman Salas, January 25, 2002, FCC Docket WT 01-184, p. 2.

of competition. At best, churn rates indicate the level of competition on the basis that, if there is more intense competition, *it is more likely, other things being equal*, that consumers will switch networks. This treatment of churn rates is consistent with the view adopted by UK regulator Ofcom, who referred to the high level of switching between providers or tariff plans as a positive indicator of competition.<sup>31</sup>

## **6. Historical behavior**

In analyzing the level of competition in the Irish wireless sector, ComReg specifically focused on historical conduct by one or more MNOs that was suggestive of the existence of market power. Allegations of historical conduct suggestive of market power include (1) the MNOs' simultaneous price increases, (2) intentionally confusing pricing plans ("fogging" practices), and (3) stable market shares among MNOs.

## **7. Likelihood of collusion**

Regulators frequently examine the likelihood of tacit collusion by examining market conditions that are conducive to such behavior. In cases where there is a high likelihood of tacit collusion, regulators might intervene. Conversely if market conditions make collusion unlikely, then regulators would tend to refrain from intervention. For instance, even though it did not find any evidence of single or collective SMP, the Spanish regulator, CMT, found conditions in the wholesale market to be conducive to sustainable tacit collusion. Specifically, CMT found that there were strong incentives for the three MNOs to coordinate their pricing actions. High and stable profitability, in turn, would reinforce the MNOs' incentive to maintain high prices and deny access to MVNOs and resellers. Consequently, CMT opted to intervene in the wireless wholesale market.

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<sup>31</sup> Office of Communications, "Effective Competition Review: Mobile," Statement issued by the Director

For tacit collusion to be feasible, there are two conditions that need to hold. That is, MNOs have to (1) have the incentive to coordinate, and (2) have the ability to coordinate. We will discuss each of these necessary conditions for tacit collusion below.

### ***Incentive to coordinate***

As noted by ComReg, the incentive to coordinate is largely based on assessing the merits of “going it alone” versus “aligning behavior.” Incentives for coordination are likely to be stronger when there are: (1) few firms in an oligopoly, and (2) the key competitiveness indicators of those firms are relatively similar.

### ***Ability to coordinate***

In order to be able to coordinate, a number of basic conditions must be met, including (1) the ability to detect cheating, (2) the enforceability of compliance, and (3) actual and/or potential market constraints.

Even if there were an incentive to align behavior, the MNOs would need to be *able to detect cheating*. If cheating cannot be detected, then the ability (and incentive) to coordinate is limited. For cheating to be detectable requires a high level of transparency in each MNO’s product and service offerings as well as their terms and conditions. Transparency can facilitate reaching a consensus position and ensures that deviations from this position can be detected.

Fundamentally, the products and services offered by the MNOs are publicly available, and the terms and conditions are well known. Moreover, the mobile market is characterized by continuous and repeated interactions, and, if an MNO were to change prices or offer access to an MVNO, this would be immediately known to its competitors, prompting retaliation. Thus, MNOs appear to be able to detect cheating. Some doubt, however, remains as many parties have

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General of Telecommunications, September 26, 2001, ¶ 2.28.

informed us that a comparison of price plans is almost impossible as the plans are structured differently, contain different variables, and are rather confusing. Nevertheless, we believe that, given the MNOs' sophistication, they would be able to detect cheating.

Furthermore, in order to reach a consensus position, there needs to be a simple way to coordinate. In Ireland, ComReg found that the two MNOs had a common focal point with two dimensions. One dimension was price and the other was denying access to independent entities to upstream elements, such as in the case of wholesale airtime. We agree with ComReg that price and wholesale access are two important dimensions of a possible focal point. In addition terms and conditions offer a third dimension.

For the MNOs to coordinate on price, their products must be generally homogenous. Given the fact that the products and services offered by the MNOs are substitutes (i.e., in the same product market), it is not surprising to find that they broadly offer the same portfolio. That is, they all offer voice, SMS, email, and Internet access, in addition to some "attachable" features, such as ring tones, news, and so on.

*The enforceability of compliance* is a necessary condition for coordinated behavior as, without it, the members of the oligopoly would deviate from the focal point and the coordinated behavior could not be sustained in the long run. Each member must be aware that cheating (in order to gain market share) would result in identical action by the other members, thus terminating the oligopoly. As noted in the case law and cited by ComReg:

The Commission must not necessarily prove that there is a specific 'retaliation mechanism' involving a degree of severity, but it must none the less establish that deterrents exist, which are such that it is not worth the while of any member of the

dominant oligopoly to depart from the common course of conduct to the detriment of the other oligopolists.<sup>32</sup>

The economic literature diverges on what constitutes a sufficient deterrent mechanism. Some economists find that the mere breakdown of collusion is sufficient to deter cheating. If so, then the condition of enforceability of compliance is present—in the wireless market and likely many other markets.

As noted by ComReg, *actual and/or potential market constraints* can discipline prices and exert significant competitive pressure on the members of the oligopoly.<sup>33</sup> Market constraints can come in many forms. First, a smaller “maverick” MNO can upset collusion by undercutting other MNOs through lower prices or increased quality of service.

### *Other considerations*

In addition to the considerations above, there are a number of other attributes that contribute to or subtract from the likelihood of collusive behavior occurring in a mobile retail market.

Specifically:

- **Rapidity of market growth:** if the market is growing rapidly, then the short-term gains from deviating from collusive behavior are more likely to be outweighed by the losses that result from future retaliation by competitors, thereby making collusion more likely.
- **Stability of demand:** Similar to the point above, in markets with large demand fluctuations, there is a greater incentive for noncollusive behavior at the peak of the cycle, as any future losses from retaliation would be reduced as demand falls. Thus, noncollusive behavior could appear at the peak even though it would not do so at other points of the cycle.
- **Market price elasticity of demand:** If the market elasticity of demand is high, the cost of retaliatory price reductions will be mitigated by the resulting increase in market demand. In such circumstances, collusive behavior is less likely to be sustainable.
- **Entry barriers:** Generally, there are substantial barriers to entry into the mobile market, especially the requirement for a spectrum license, approval from regulators and local municipalities, and the high upfront costs required to commence operations. Entry makes

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<sup>32</sup> Commission for Communications Regulation, “Market Analysis-Wholesale Mobile Access and Call Origination, Document No: 04/118 and 04/118a,” December 9, 2004, ¶4.89, citing the European Court First Instance in the *Airtours* judgment, ¶ 62.

<sup>33</sup> *Ibid.*, ¶ 4.98.

collusive behavior less likely as it is potentially unsustainable. Therefore, high barriers to entry make coordinated behavior more likely.

- **Buyer power:** Large (countervailing) buyers can make noncollusive behavior more attractive because the gains from breaking ranks and winning the business are potentially substantial and like for like retaliation is more difficult.
- **Customer switching costs:** These reduce the potential benefits of noncollusive behavior, but also reduce the impact of retaliation. They therefore probably have a broadly neutral effect.

## **B. Business Models for MVNOs**

The term “business model” refers to the economics of a company’s revenue, cost, and profit strategy. Its primary objective is to demonstrate the long-term viability of the company, or in the present instance an MVNO. Most generally, there are four components to a business model: (1) access to infrastructure, (2) value proposition, (3) customer relations, and (4) finances. We will discuss each of these components below and address how they apply to MVNOs.

### **1. Access to infrastructure**

Much like any company, a new MVNO needs an able and experienced leader that can efficiently execute an MVNO’s business model.

Critical to any MVNO is access to network infrastructure and possibly other aspects of the business that complement the business model. There are only two ways by which an aspiring MVNO would gain access to another network; either it commercially negotiates a wholesale agreement with an MNO or it obtains access on terms mandated by the regulator. As we discuss below, mandating wholesale access and the terms on which it takes place can be costly and comes with significant economic risk. If market conditions are such that competitive forces cannot discipline prices, service offerings and quality (i.e., there is market failure), then regulation might be economically justified. If market conditions are not conducive to market failure, then commercially negotiated agreements are economically superior to regulatory intervention.

A commercially negotiated agreement will only exist if both parties stand to benefit from it. For the MNO, this means that *at a minimum* the wholesale revenue obtained from an MVNO must cover its wholesale operational expenses, customer capital expense (see below), and its expected rate of return. Alternatively stated, wholesale revenues must at a minimum equal the residual of total service cost minus the avoided costs (from only providing whole service rather than retail service). The actual willingness to enter an agreement with an MVNO will also depend on a number of other aspects. For instance, if an MVNO were to compete directly with the MNO, rather than widening or deepening the market, then the MNO might also consider the lost profits due to the wholesale agreement. Spare capacity, reputation effects, and costs of integrating an MVNO are examples of other factors influencing an MNO's willingness to provide an MVNO with wholesale access.

For the aspiring MVNO to enter a commercially negotiated agreement, its ARPU must *at a minimum* equal the wholesale access cost, its operational expenses, and its rate of return. Over the lifetime of the customer, it will also need to recover customer acquisition fees, such as handset subsidies and marketing.

The common component of these two equations is the wholesale discount, measured as a percentage off the retail price. That is, if a discount or range of wholesale discounts exist where both the MNO and MVNO cover their minimum requirements, as outlined above, then commercially negotiated agreements are possible, albeit not guaranteed. Conversely, if such a point or range does not exist, such agreements are unlikely to occur and there might be no MVNO business model.

## **2. Value Proposition**

The MVNO's value proposition is crucial in at least two aspects. First, by adding value to the

MNO, the aspiring MVNO is more likely to obtain a wholesale agreement as the engagement is more likely to be mutually beneficial. Second, in a saturated market, an MVNO needs to provide an innovative service or service bundle, which will increase its likelihood of long terms survival.

### **3. Customer relations**

Clearly defining, targeting, and supplying its customer is the third prong in a sound business model. While the level of saturation, again, works against achieving this requirement, companies that have existing customer relationships and distribution channels are more likely to be successful.

### **4. Finances**

As discussed above, aspiring MVNOs will either need to reduce their costs or target high ARPU customers in order to be profitable. Of particular concern is the fact that the saturated market might not provide an MVNO with sufficient opportunities to obtain sufficient revenues to remain viable over the long run.

## **IV. Effects of Regulator-Mandated MVNO Players**

The effects of regulator-mandated MVNO entry can have far reaching consequences if such regulation is not warranted. Primarily, such intervention can impact on consumers, the industry, competition and hence the general economy.

The potential harm to economies where regulation is not warranted is multifold and well documented in the economic literature. At the heart of this literature is the fact that regulation is not free; it comes with substantial costs. The costs materialize in the form of regulatory costs (e.g., setting of rates, access terms and conditions) and market risk. As found by Kahn,

regulation and market forces “compete” in disciplining market players.<sup>34</sup> Kahn notes that there is “no rational half-way house between thorough regulation and free competition.”<sup>35</sup> In addition, there is a high likelihood that, because regulators do not have full visibility of the costs involved, regulated terms of access will either be too high, therefore precluding entry, or too low, thereby encouraging inefficient entry. The latter means that costs in the mobile telecommunications industry will actually increase as the result of regulation.

Therefore, unless there is market failure, imposing regulation does not guarantee an increase in competition and hence social welfare. Specific to the MVNO question, unless there are clear signs of market failure, imposing regulator-mandated MVNOs may well be detrimental to competition and innovation in the wireless market, as it might also lead to inefficient entry.

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<sup>34</sup> Alfred E. Kahn, “The Uneasy Marriage of Regulation and Competition,” *Telematics* Vol. 1, Number 5, pp. 1-17.

<sup>35</sup> *Ibid.*, p. 8.