MOBILE VIRTUAL NETWORK OPERATOR STRATEGIES: CASE FINLAND

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Abstract

Mobile virtual network operators (MVNO) buy network capacity from a mobile network operator (MNO) to be able to provide a full portfolio of mobile services for their own subscribers. This paper provides insight into different types of MVNO and their possible business strategies. A strategy framework for classifying MVNO strategies is developed based on in-depth interviews of Finnish operators. As a case study, the developed framework is then applied to the Finnish MVNO market. The analysis shows that real MVNOs can be mapped to the framework although some MVNOs exercise multiple strategies at the same time. It is observed that most Finnish MVNOs have adopted the short-term strategy of competing with price rather than services. In addition, several small MVNOs show evidence of longer-term exit strategies based on a targeted merger with a MNO or a bigger MVNO.

Key Words

MVNO, regulation, competition, business strategy, Finland

1 Introduction

In the Western European countries the mobile communication market has reached its saturation point (approximately 90% penetration of population). As the market has matured, the basic subscription has become a commodity product and the competition is based increasingly on existing subscribers.

Until recently, each national market has consisted of only few operators. The two main types of operators are

- *mobile network operators* (MNOs) providing a mobile network for the purposes of transmitting, distributing, or providing messages and
- *mobile service operators* (MSOs) transmitting messages over a mobile network obtained for use from a mobile network operator.

The European Union, however, continues its efforts to increase competition. Communication directives issued by the EU [EU03] have changed the telecommunications regulatory framework and lowered the entry barriers for mobile market. SIM-based mobile services can be offered without owning a radio network or rights to the required radio spectrum. Simultaneously the launch of mobile number portability has decreased switching costs and increased churn. These changes have opened up the mobile communications market to new service providers.

This paper studies the business of mobile virtual network operators (MVNO), a new type of communication service provider, by defining the basic concept, classifying the possible MVNO strategies, and analyzing the MVNO situation in the Finnish mobile operator market as a case study.

2 Method

For identifying the possible MVNO strategies and related key characteristics we performed a set of open in-depth interviews with six senior business developers covering all three Finnish MNOs and some MVNOs. Based on the analysis of these interviews a comprehensive set of strategies and a set of characteristic features was defined and visualized as a simple table. For testing its feasibility the table was applied to the Finnish market by classifying all Finnish MVNOs using publicly available market and company information. Results of the classification were discussed with the interviewed persons to improve analysis and to disseminate findings.

This research method includes a close collaboration loop with the target companies and their strategy planners, which resembles the approach known as innovation action research, see for instance Kaplan [Kap98]. Our approach produces country-specific results. However, we believe that our framework is rather generic and have compared our finding to other countries when possible. Nevertheless, we acknowledge the problems of generalizability (see also [Luk95]).

3 Definition of MVNO

MVNOs provide mobile voice and data services without owning the access rights to the spectrum they use [Xav01]. Consequently, MVNOs can be described as a subgroup of MSOs. The radio capacity used to provide these services is gained through commercial agreements with licensed mobile network operators (MNOs). Figure 1 presents the simplified hierarchy of the mobile operator market.

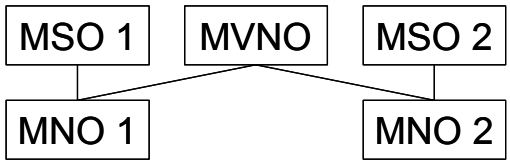

Figure 1 Hierarchical structure of the mobile operator market

MVNOs are a new, mostly European, GSM phenomenon. The versatile backgrounds of MVNOs can be divided into three groups [Kri01] 1) fixed network operators, 2) mobile network operators in another geographic market and 3) companies with non-telecom business at the geographical market. For an MVNO having no background in telecommunications it is typical to have a strong brand known from its other operations, e.g. Virgin Mobile.

There is no commonly accepted classification for MVNOs. MVNOs can be divided into subcategories based on the network components owned by the MVNO [Kri01, Cur01]. All the MVNOs deliver their own SIM cards and take care of the branding, marketing, billing and customer care. The difference arises in whether a MVNO has its own

- MSC Mobile Switching Center
- HLR Home Location Register
- IN Platform.

Some authors [Ana02, Kri01] see that the technology-based definition mentioned above is ultimately flawed and thus not valid. They suggest rather an approach based on services according to whether the MVNO itself provides

- only pre-packaged services
- tariff and service design control or
- service implementation and differentiation.

It is, however, true that the level of technical independence defines the services and the level of differentiation the MVNO is able to offer. Common in both approaches is that the more service creation elements a MVNO has, the more 'pure' or 'true' MVNO it is. MVNOs providing only pre-packaged services are often called 'service re-sellers' or 'brand operators'. It is also possible for a MVNO to offer its services for another MVNO – this is typical in a case where a more 'true' MVNO with some technical resources provides services for a brand operator.

From the MNO's viewpoint, making an agreement with a MVNO is a big strategic issue. Selling network capacity to one or several MVNOs can bring new subscribers and traffic into the network broadening the customer base of incumbent MNOs at zero cost of acquisition. Selling of the capacity is also an efficient way of sharing network costs. On the other hand, the entrance of a MVNO is likely to lower the prices in the market. Therefore it can be said, that the situation is paradoxical: MNOs should not let MVNOs in unless they are certain that the MVNO in question will not enjoy significant success. MNOs should thus find the 'Comfort Zone' [Tor02], the most beneficial and profitable amount of network capacity contracts. This comfort zone should be researched from the viewpoints of pricing, customer structure, services and the business strategy of the MVNO.

4 Regulation

Recent changes in the regulatory environment and especially in the communication directives issued by the European Union [EU03] have enabled the business opportunity for MVNOs. The most significant directives are presented in the following.

The division of telecommunications operators to network operators and service operators is based on the EU legislation. The main focus of telecommunications regulation is to oblige network operators to lease out capacity from their networks to all service providers at a fair price. A fair price consists of appropriate investment, operating costs, and modest return on the investment [Kri01].

Network operators having 'significant market power' (SMP) must provide fair access to their networks. Furthermore, they are obliged to provide the financial information of transmission services to the regulator so that the fairness of their network tariffs can be estimated [Kri01].

The purpose of these regulatory actions has been to increase competition in the mobile communications market and thus accelerate the development of new services and technical innovations. Regulators favor MVNOs because they promote this goal. To make the mobile communications market easier to access, national regulators can impose incumbent operators to lower the barriers to enter the market. Examples of these acts are mobile number portability (MNP) and price regulation of interconnection and termination fees. Especially for the small MVNOs, the regulation of these fees is essential to enter into mobile communication markets.

Some EU member countries have not yet incorporated the new EU Directives into their national law and practice. Many national regulators have found that their existing regulations cannot be applied to MVNOs without amendment [Ana02]. Especially the amount of regulation needed in the relationships between MVNOs and MNOs is still under consideration in many countries: should regulators e.g. force the MNOs to reserve a certain minimum capacity for MVNOs? This decision has already been made e.g. in Hong Kong, where the regulator requires 3G networks to reserve 30-50% of their capacity for MVNO use [HK05]. However, as a significant precedent, the ComReg of EU found that Vodafone and O2 in Ireland have significant market power and imposed an immediate obligation on these MNOs to provide access to other companies on their networks [ComReg05]. On the other hand, in a similar case the French regulator ARCEP did not get support from the EU for their notified draft measures to oblige MNOs to sell capacity to MVNOs [EU05]. Although the EU progresses with caution the general sentiment is pro-competition and thus supports the business opportunity of new MVNOs. This logic is also supported by the observation that in some countries the number of MNOs cannot be easily increased to promote competition due to the weak business case of new physical radio networks.

5 MVNO Business Decisions

The simplified MVNO business objective obviously closely resembles that of MNO, maximizing the profit of the total business as follows, e.g. [Poh04],

$$\text{Profit} = \text{ARPU} * \text{Customers} - \text{Cost}$$

In the case of MVNO the responsibility of ARPU (average revenue per user) generated by customers moves from MNO to MVNO since the MVNO buys the required network capacity from a MNO. Contracts between MNOs and MVNOs are bilateral and usually based on the total traffic (can also include a fixed fee per user). Two main sources of revenue can be identified: communication services (call/data traffic) and value added services[1]. A new MVNO can base its strategy on providing one or both of these. It needs to consider several items; How to attract customers? What kind of services to offer? How to keep the costs sustainable? Based on this information, the MVNO makes the following choices:

- customer segment
- source of revenue
- own technology
- MNO partner

Different internal and external factors have impact on the business strategy to be chosen by an MVNO. The most suitable strategy can be found by considering the following four blocks: internal resources, external environment, existing strategic position, goals and objectives [Xav01, Kri01]. The blocks with different parameters are presented in Figure 2.

[1] Also advertising income might be a possible source of revenue in the future.

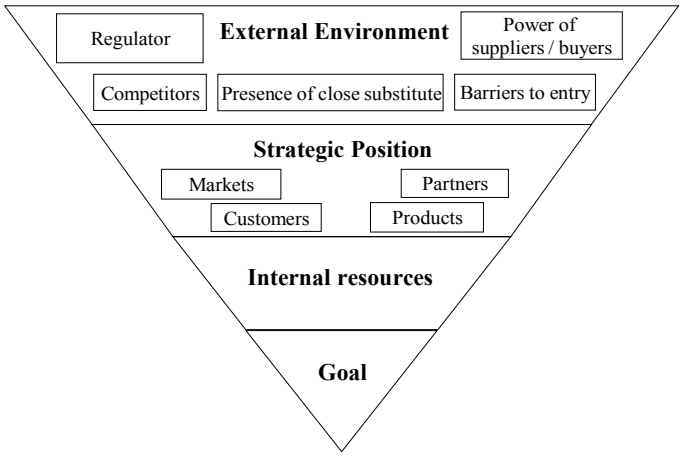

Figure 2 Strategy decision model (modified from [Kri01])

The effect caused by the *external environment* is remarkable, including the five forces defined by Porter [Por80]. Most communication markets have more than one MNO, which diminishes the *power of suppliers*. Also national regulation authorities can reduce the MNO power by restricting the charges that MVNOs pay to the MNOs by using for instance the requirement of cost-oriented pricing.

The *barriers to entry* to the MVNO market are rather low because of the regulation decisions. The biggest entry barrier is the switching cost of mobile subscribers. Regulators can significantly reduce this cost by enforcing obligatory number portability. One important factor having an impact on the willingness to switch the operator is the group effect: because of the cheap intra-operator calls, subscribers are not eager to switch the operator 'alone' but instead together with a certain group whose members make a lot of calls to each other (e.g. a family, a group of friends).

Low barriers to entry increase the amount of *competitors* in the field, giving the *buyers* power. The 'buyer's market' type of a situation results in lowered prices and smaller profits. As long as MVNOs compete with price instead of service differentiation, the *presence of close substitute* remains high and competition of the same customer group continues. On the other hand, fixed internet and content printed on paper can be seen as substitutes that don't encourage the usage of mobile communication services (e.g. bus time tables freely available on the Internet or as printed books).

A pre-existing *strategic position* defines an MVNO's position among customers and partners. An MVNO may be able to exploit its brand and sales channels of other businesses to reduce the customer acquisition cost in the MVNO business. Many MVNOs try to create business synergies between their MVNO and other businesses. This quest for synergy may, however, turn into loss of business focus.

The existing *internal resources* have a significant effect on the initial costs of MVNO business and on the service composition to be offered to the customers. Also a certain set of internal resources can form a good basis for synergies in MVNO business operations. These resources also decrease the risks during the ramp-up of business.

The *goal* for an MVNO is to make profit through fulfilling the expectations of the chosen customer segment so that the customers experience the level of service that satisfies their needs.

Through a careful research on external and internal factors as well as target customers, it is possible to assess the profit potential of alternative MVNO business strategies.

6 Possible MVNO Business Strategies

Porter defined the three generic types of strategies in [Por80] consisting of cost leadership, segmentation and differentiation. Based on this classification and the interviews with Finnish MNOs and MVNOs (presented in Chapter 2) we have structured five MVNO strategy groups:

- low price
- narrow focus
- service differentiation
- service reselling
- international clustering

In case the MVNO business strategy is based on *offering services with low price*, the main competitive advantage must be the ability to keep costs low. All the operations of the company must be aligned to meet this target. The service portfolio is narrow including only the basic services for the selected, rather large customer groups. A low organizational structure, a large customer potential, and a short reaction time to changes in the market are benefits for the MVNOs following the 'price leader' strategy. However, in order to survive with this strategy choice, a large customer base is required because of the small profit margins. Also the amount of resources for new service development is minimal and trade-offs are needed to be able to provide the most cost-effective services. Service platforms and roaming contracts are usually not handled by the price leader itself but by the MNO. One major challenge for a low price MVNO is the cost level of its MNO contract. A market, where each MNO controls its own family of MVNOs may not create enough competitive incentive to MNOs unless the number of clearly competing MNOs is large enough, at least three.

MVNOs that select to *focus on one customer segment* typically cannot achieve business volumes big enough to justify investments on own service platforms. Tailored marketing and customer care for the chosen segment allows setting the expected ARPU high. Strategic alignment between the partnering MNO and MVNO is typically good since a large MNO cannot easily focus on small niche segments. This MVNO strategy is suggested by many authors [Kri01, Tor02].

An MVNO can also choose to *offer differentiated, value added services* for demanding customers. Here the service mix should be rather large to attract (especially business) customers. One possibility is to offer bundled services based on the company's earlier core competence (e.g. fixed and mobile subscriptions, office solutions). These 'service leaders' might also have multiple target segments that use the same services with different, customized content. While competing with differentiated services, a MVNO has the potential to gain a rather high ARPU. Also the ability to develop new services independently (or in co-operation with partners) for the dynamic needs of the customers is an advantage. A major problem with this strategy has been the absence of profitable business models: users are not willing enough to pay extra for the value-added services (only some service concepts, like voice mail and ring tones, have been successful).

An MVNO with strong technology competences but low brand value can select to become a *reseller* and enabler for other MVNOs already having a strong brand. This strategy requires large customer volumes due to the low expected ARPU, which is likely to create conflicts of

interest with the supplying MNO. Consequently, the regulator's support appears particularly crucial for this strategy.

Global and regional MNOs can select to enter a new country as an MVNO instead of investing in or acquiring a local MNO. This *international clustering* approach enables a fast initial service roll-out if the foreign MNO can use their existing service machinery located outside of the target market, as well as their existing service portfolios. As a drawback the foreign MNO entering as an MVNO has to start from a zero market share.

The features of different strategies are summarized in table 1.

Table 1. MVNO strategies and their features

	Price	**Focus**	**Differentiation**	**Reselling**	**Clustering**
Source of roaming contracts	Local MNO	Local MNO	Local MNO	Self	Foreign MNO
Source of service platforms	Local MNO	Local MNO	Self	Self	Foreign MNO
Importance of content partners	Low	Low	High	Low	High
Importance of new services	Low	Medium	High	Medium	High
Importance of own brand	Medium	High	High	Low	High
Feasible number of subscribers	High	Low	Low/medium	High	Medium
Feasible ARPU	Low	High	High	Low	Medium
Typical initial target segment	Students	Minorities	Early adopters	Other MVNO	Business users

7 Case Study: Finnish Market

Finland has a remarkable history in GSM business: the first GSM call was made in Finland and until the year 2000, Finland had the highest mobile subscription penetration in the world (over 90% today). In addition, also the competition has long roots in the Finnish telecommunications market because of the numerous local telephone operators and the competition between public and private telephone operator families. Besides the historical facts, the Finnish MVNO market is interesting due to the presence of a large number of diverse MVNOs. However, despite the Finnish success in the mobile market, the country has fallen behind in international rankings and mobile data usage during the last two years [Ves04].

Finland has three GSM licenses (Sonera Mobile Networks, Elisa and Finnet Verkot) and had four UMTS licenses[2] (the incumbent GSM license owners and Swedish Tele2). Since June 2005, the fourth UMTS license owned by Tele2 Finland was however cancelled by the Finnish Government. The market share situation of incumbent operators' service operators is TeliaSonera 50%, Elisa 26% and DNA (Finnet Group) 12% (as of January 2005) [Eli04, Tel04].

[2] awarded 1999 based on beauty contest

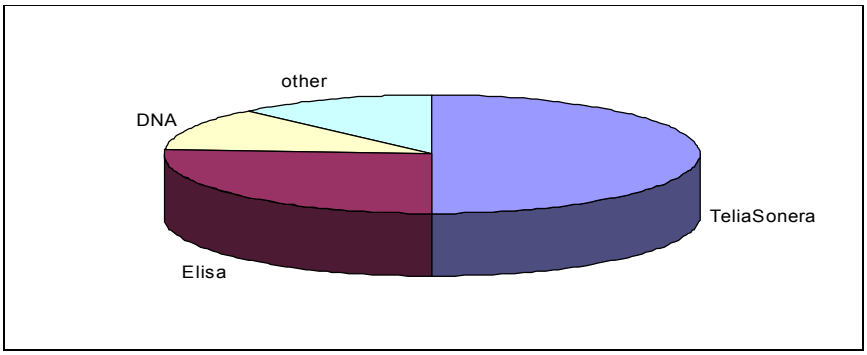

Figure 3 Market shares in the Finnish GSM market

Recent changes in regulation have made the market easily accessible for MVNOs. The Finnish Communications Regulatory Authority considers the three incumbent operators as significant market powers in the call termination (downlink) traffic market [Fic05]. The EU legislation imposes that the uplink wholesale traffic in mobile networks becomes subject to SMP legislation in the EU markets and that the incumbent operators publish the terms and prices of interconnection [MINTC03]. The most effective trigger for MVNOs to start their operations, however, was the requirement to enable mobile number portability (MNP) between mobile network operators in July 2003 [Fic05, Kii04, Ves04].

7.1 MVNO market structure

There are thirteen MVNOs in Finland (Table 2). In 2004 the highest number was almost twenty, but some of the MVNOs have merged or gone out of the business. MVNOs together with new content providers bring a large number of new players in the market. As a consequence, the traditional value chain has turned into a more fragmented value network.

Table 2 MNOs, MSOs, MVNOs and brand operators in Finland (as of July 2005)

MNO	Incumbent MSO 'True' MVNO	'Weak' MVNO	Brand operator
Sonera Mobile Networks	TeliaSonera	Globetel Finnetcom NetFonet Tele Finland CDF Mobile	Hesburger
Elisa	Elisa Saunalahti Tele2	Cubio Kolumbus TDC Song	
Finnet Verkot	DNA Finland	Fujitsu Services GoMobile Wireless Maingate	

The main business strategy of the MVNOs in Finland is to compete with price. Thus far, only few MVNOs have chosen clearly another than the low price strategy.

7.2 Strategy Examples

Tele2 Finland has a unique position in the Finnish MVNO market: it was the first MVNO in Finland using its own MSC. An own MSC enables the production of own services as well as independent interconnection and roaming agreements. Tele2 has also a remarkable position in other parts of the Europe: it has operations (fixed and mobile) in 23 countries and 6 million mobile subscribers. The background of Tele2 Finland is a mixture of the groups mentioned in chapter 2: it provides fixed Internet services in Finland (among many other countries), MNO services in many countries (e.g. Sweden) and MVNO services in some European markets. Thus, Tele2 is deploying the *international clustering strategy* in our conceptual model (see Table 1).

The main business strategy of Tele2 Finland is to offer 'aggressively' priced basic services through their modular network structure: they offer pre-paid subscriptions without monthly charge. Despite choosing the *low price strategy*, Tele2 negotiates its interconnection contracts itself and uses its own platforms and existing resources for service development. The costs are kept in minimum with economies of scale: by using existing service creation resources, concepts and personnel (located in Sweden, where Tele2 operates as an MNO). In addition, exploiting the Internet as the main distribution channel allows minimization of distribution costs.

Tele2 Finland was the first operator providing low-priced pre-paid subscriptions in the Finnish market. Because of their existing network resources and mechanisms, another possible source of revenue for Tele2 could be to offer their pre-paid service concept for other MVNOs (brand operators), thus being a service reseller. This way Tele2 could make larger profit of their assets and establish partnerships that could increase the usage of their own services, too. This must, however, be agreed with the MNO concerned.

Tele2 Finland (actually its subsidiary Finnish 3G) had the fourth Finnish UMTS license for two years 2003-2005. They could have exploited business synergies between MVNO operations in GSM network and MNO operations in UMTS network, but now the license has been cancelled by the Finnish Government.

Saunalahti has combined three strategies of our model: they offer the *low price* services directly to their customers, provide *differentiation with content services*, and *resell their network capacity* to focused brand operators. Saunalahti was the first Finnish operator to provide e.g. presence services for its subscribers. They have won over 460 000 subscribers from the incumbent operators within three years, resulting over 10% market share. Saunalahti also bundles their mobile subscriptions with their fixed broadband Internet subscriptions. As an MVNO enabler they have provided services (SIM cards) for two brand operators. Saunalahti was the only MVNO in Finland buying network capacity from two different operators (Elisa and TeliaSonera), thus being able to get low price network capacity. Since June 2005, Saunalahti has concentrated all their traffic to Elisa's network. Furthermore, Elisa made an offer to buy Saunalahti in July 2005. The Finnish Competition Authority hasn't accepted the merger yet.

Fujitsu Services, a large IT service company, use the MVNO strategy of *service differentiation*: they integrate GSM subscriptions to a complete, customized IT offering targeted mostly at large enterprises including. Note that combining GSM with voice-over-IP office telephony Fujitsu Services is able to challenge the traditional operators on their hometurf with a full voice telephony offering to enterprises. Thus in addition to the differentiation strategy, they apply *the focus strategy*.

Tele Finland is a MVNO owned by TeliaSonera. This brand operator strategy allows incumbent operators to try out new marketing concepts and low prices without losing their credibility in 'premium' user segments[3] who still are ready to pay the premium prices and create the main income of TeliaSonera. Tele Finland deploys thus two strategies: *low price strategy* to attract all new customers and *focus strategy* to attract especially the TeliaSonera customers seeking for a low price subscription (and perhaps ready to change operator).

All the above mentioned Finnish MVNOs and their strategies are gathered in Table 3. Applying the strategy scenario model to the Finnish market shows that Finnish MVNOs are deploying multiple strategies (instead of just one).

Table 3 Finnish MVNO strategies

	Low price	Focus	Differentiation	Reselling	Clustering
Tele2 Finland	**X**				**X**
Saunalahti	**X**		**X**	**X**	
Fujitsu Services		**X**	**X**		
Tele Finland	**X**	**X**			

There used to be one MVNO on the Finnish mobile market having an entirely different business strategy: to compete with content services. This player was *MTV3*, the leading commercial television channel in Finland. However, spring 2005 they closed down their operations as MVNO and decided to concentrate on content business instead of mobile subscriptions.

There are no truly global MVNOs in the Finnish market. The only global player in the market is Vodafone, but instead of offering its own MVNO services, it has chosen a partnership with Elisa. This co-operation allows Elisa's customers to use their home services in Vodafone's network globally.

7.3 Effect on the Market

After the entrance of MVNOs, all the three incumbent MNOs have had to lower their prices and subsidize their subscriptions with free air time and goods. The decrease in the prices of GSM calls was 6,9% during 2003, which causes a significant gap in price changes compared to the earlier years. This gap is illustrated in Figure 4. New MVNOs have also roughly doubled the churn: during the first year after the MNP and the invasion of MVNOs, 23% of the subscribers had changed their service operator [Num05]. By April 2005, already 2 million numbers have been ported, which would mean almost a half of the Finnish mobile subscriptions (4,5 million subscription altogether). This isn't true, however, because many people (460 000) have ported their numbers more than one time [Num05].

[3] Also Elisa has its own brand MVNO *Kolumbus*, which is deploying the same type of strategy as TeliaSonera with Tele Finland.

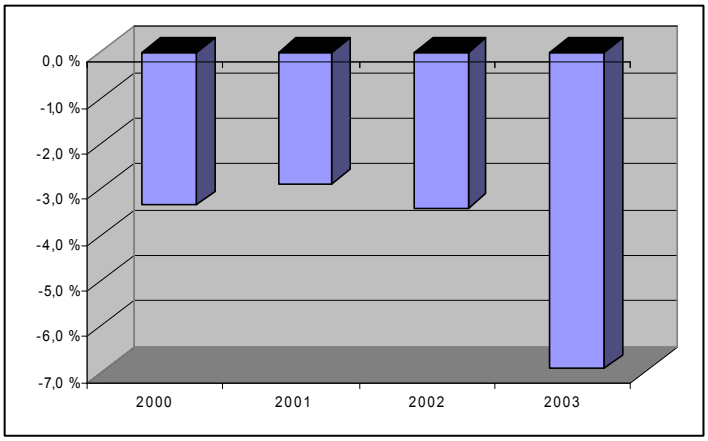

Figure 4 Changes in GSM call prices 2000-2004 [MINTC04]

Because most of the new MVNOs in Finland have chosen the low price strategy, the usage of new services hasn't increased as expected. MTV3 was the only MVNO providing new differentiated mobile content services for consumers, but they have finished their mobile operations by now. Even the MVNOs following the focus strategy compete mainly on price. New 'tariff packages' have been introduced with free text messages (a.k.a. included in the monthly subscription fee). On the other hand, many MVNOs have chosen the 'one rate for all calls', which has motivated the incumbent operators to switch from multi-tariff pricing to a more unified pricing. Also the distribution channel of subscriptions has dispersed: now it is possible to buy a GSM subscription on the Internet, or even at the hamburger counter.

Based on the on-going development of competition in the Finnish GSM market, MVNOs are also likely to exist in 3G networks to share the costs of the networks and to develop new attractive services (e.g. to create differentiated products). A good example of this development is Sweden, where even the strong incumbent operators (Tele2 Sweden and Telia) are sharing the third generation network to meet the coverage requirements set by the licensee. This kind of network sharing is possible also in Finland: the current regulation allows the Finnish 3G network operators to share up to 65% of their networks [MINTC05].

The latest change on the market, the possible merger of Elisa and Saunalahti, could however change the market development direction. In case the biggest MVNO is consolidated to one of the incumbents, can the smaller ones keep their position? Is their strategy strong enough against the three incumbents? Or perhaps this merger shows evidence of MVNOs' longer-term exit strategies based on a targeted merger with a MNO or another MVNO.

8 Conclusion

Our set of open in-depth interviews with all three Finnish MNOs and some MVNOs provided data for classifying the possible MVNO strategy scenarios. The case studies show that the presented generic classification of MVNO strategies is applicable at least in the Finnish market. Our qualitative conceptual model helps to identify and explain strategic choices of MVNOs. Applying the strategy framework to the Finnish market shows that most Finnish MVNOs are deploying simultaneously more than one of the strategies listed in our table.

Case Finland indicates that the regulatory encouragement for creating an MVNO opportunity is likely to increase competition and thus lower the tariff levels of basic services. The usage of existing MNO networks is likely to become more dynamic and effective. MVNOs could concentrate on service provision and innovation instead of basic technology. However,

despite the expectations for increased service innovation, the Finnish MVNO market so far has not fulfilled the promise.

The lack of previous experience prevents estimating the consequences of the low price MVNO strategy dominant in Finland. New MVNOs must make sustainable agreements with the incumbent MNOs for basic network services (and in case of a true MVNO, also interconnection costs). Lower price is only a short-term strategy, because it can be easily responded by competition at least temporarily.

From the viewpoint of MNOs, the emergence of MVNO market is an opportunity in addition to a regulatory imperative. It opens possibilities for new customer segments, new experimentations, and may prevent market share losses to other MNOs (especially in case of market leaders). It should be noted that the Finnish market is still in the mode of rather separate, MNO-centric MVNO families. Only Saunalahti made a short exception to this: it bought network capacity from both Sonera Mobile Networks and Elisa, which gave them more negotiation power. Lately Saunalahti decided to concentrate all their network traffic to Elisa's network and soon after that Elisa announced their offer to buy Saunalahti.

It remains to be seen, whether this merger will consolidate the Finnish market back to the MNO-centric mode. The Saunalahti case shows that even the large MVNOs may choose the merger-based exit strategy, which indicates that in some markets MVNOs may remain just as a strategic tool of MNOs in the inter-MNO competition.

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