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Bundling into the future? - Structural conditions for business model design in new ICT services

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Bundling into the future? - Structural conditions for business model design in new ICT services

Abstract

Based on a case study of multi-play and mobile voice over IP (MVoIP) in primarily Denmark and Norway, the paper presents an analysis of the structural conditions for the design of business models regarding new information and communication services. Multi-play and MVoIP represent different kinds of services in terms of structural conditions market-wise and in regulatory terms. As the two service categories are relatively new on the market, dominating business model designs have not yet settled and the strategic choices of companies are still open. Being on the market, the discussion on the business model design, however, transcends the purely speculative stage.

The structural conditions studied are the market conditions including the regulatory conditions. In addition, the different technological solutions are examined, as mobile VoIP as well as multi-play include different technology solutions for the delivery of services to users. This means that the analysis includes technological as well as market-based and regulatory elements. Using empirical material from Norway and Denmark, the paper presents a comparative analysis of the structural conditions and the business model choices made by actors in the market. The paper also makes comparisons with other country cases having different market conditions.

The aim of the analysis of the structural conditions is two-fold: On the one hand, to deepen the understanding of the structural condition and, on the other hand, to discuss the conditions for the different business model design options. The paper examines the regulatory policies and market characteristics in mobile VoIP and multi-play, and it discusses how these policies and characteristics affect the business model decisions of service providers in the two areas. Furthermore, it focuses on the relationships between regulation, competition and innovation in the two service areas.

Introduction

In the 1990s, the Nordic countries emerged with an image of being one of the most advanced and sophisticated regions in terms of ICT, in particular telecommunication services and proliferation of ICT in society. In this period, the rapid diffusion of the mobile communication system GSM made all of these countries seem far ahead of the rest of the world. This image was bolstered by the industrial and technological success of Ericsson and Nokia – their Nordic identity contributed to the image of excellence of the Nordic countries. Since then, many other countries have caught up. However, the Nordic countries remain in the 'leading group'. According to the World Economic Forum's *Global Information Technology Report 2007-2008*[1], all the five Nordic countries are among the "top ten" countries of 127 economies/nations surveyed. Having a rank of number 10, Norway was at the bottom of this "top ten"-list, but Denmark was number 1, closely followed by Sweden as number 2 – and Finland as number 6 and Iceland as number 8. Although one may question the relevance of some of the indicators and assessments used in this report, it seems fair to suggest that the Nordic countries as a region represent a kind of world leadership in ICT. Needless to say, this leadership also reflects the economic wealth and welfare system of these countries, i.e. what is often referred to as the "Nordic model", hence being on the top of World Economic Forum's list may also be interpreted as an indicator of affluence, i.e. a factor that causes ICT sophistication and level of knowledge and innovation in ICT.

Still, the situation in the Nordic countries is interesting because in many ways this may be viewed as a front runner whose experience may be valuable to other parts of the world. This encompasses a broad range of issues and dynamics, however, we think that a key for understanding this and, perhaps, developmental trends that will become important in the future, will be provided by analyses of structural conditions for business model design in new ICT services. For this purpose, this examines mobile VoIP (MVoIP) and multi-play – services that already are on the market, however, in their infancy, and which represent different kinds of services in terms of structural conditions market-wise and in regulatory terms. The development of these services may set the direction of future development, i.e. initiate developmental trajectories based on their present status. As the two service categories are relatively new on the market, dominating business model designs have not yet settled and the strategic choices of companies are still open. Being on the market, the discussion on the business model design, however, transcends the purely speculative stage. The structural conditions studied are the market conditions including the regulatory conditions. In addition, the different technological solutions are examined.

The aim of the analysis of the structural conditions is two-fold: On the one hand, to deepen the understanding of the structural condition and, on the other hand, to discuss the factors that may influence various business model design options. The paper examines the regulatory policies and market characteristics relevant for the development of mobile VoIP and multi-play, and it discusses how these policies and characteristics may affect the business model decisions of service providers in the two areas. Furthermore, it focuses on the relationships between regulation, competition and innovation in the two service areas.

Using empirical material mainly from Norway and Denmark, but also from other Nordic countries, the paper presents a comparative analysis of the structural conditions and the business model choices made by actors in the market. The paper also makes comparisons with

[1] Cf.: http://www.weforum.org/en/initiatives/gcp/Global%20Information%20Technology%20Report/index.htm

other country cases having different market conditions. The empirical material consists of two different sources:

- in-depth interviews of twelve high level policy makers and analysts in Norway and Denmark,
- analyses of relevant policy documents, business analyses and statistics, in addition also "open sources" on the internet that are relevant for the topics of this paper.

Prior to this data collection, the authors participated in a pre-study which gave a general framework and focus for this study, cf. Pedersen et al. (2007)

The basic theoretical framework for the analysis is the Structure-Conduct-Performance (SCP) framework (Methlie & Gressgård, 2006). The strength of this framework is that it stretches all the way from the structural conditions, through the conduct (business models and strategies) of companies seen in connection with these structural conditions, to the actual performance of companies in the market. The focus of the present paper is on the structural conditions with a view to the framework that these conditions constitute for the business model design of companies.

Multiplay

Introduction

Multi-play[2] and affiliated terms such as double play, triple play and quad play may be described as various types of marketing driven packages or bundle of ICT-services and subscriptions offered primarily to private, residential customers, i.e. families and households. Usually, these types of packages have emerged from operators of cable television (CATV) distribution systems. A typical triple play package will consist of these services:

- television broadcasted programs (traditional CATV service)
- high speed data communication for Internet access
- telephony, provided as voice over IP, or VoIP

In quad play, mobile communication services are included as the 4th service element in the package. Compared to triple play, the proliferation of quad play is still small.
In Denmark, no fixed-line operators offer quadruple-play at the moment – i.e. all four services in one bundled package. In Norway, apart from Lyse Tele's upgrading of its "Altibox" triple play offer to quad play, the dominant offer to households/residential units is triple play and double play.

The main physical network technologies used for offering multi-play are in Denmark and Norway: Cable, DSL, and fibre. 3G can also be seen as a platform for multi-play services – depending on how multi-play is defined. Furthermore, WiMAX will be an option, but still needs some development. WiFi can also be used as one of the technological solutions in multi-play, e.g. including UMA. However, even though UMA is offered by Telia in Denmark, for instance, and even though Telia has also recently started offering a double-play solution (TV and Internet) via DSL, these two offers are not combined into one assembled package. They are marketed as different offers.

[2] Earlier, in the 1990s, the term multiplay was associated with online internet based computer games involving many players, typically such as MUDs, i.e. multi user dungeons.

In Norway, only one network operator, Lyse Tele, offers quad play, however, this is still (early 2008) on a trial basis, hence the service is offered only to a limited number of customers. For Lyse Tele, quad play represents a development of its present "Altibox" triple play package, which is offered on Tele Lyse's advanced FTTH network. The mobile communication service which is introduced in the transition from triple play to quad play is branded as "iMobil". In this wireless service, the mobile handset (or any other wireless terminal) is connected to the network by WiFi-zone at home or in the neighborhood. When and if the user moves out of the WiFi-zone, there is a seamless handover to GSM or other WiFi-hotspots. Tele Lyse has an ownership in the mobile communication operating company Network Norway; this company provides the GSM interworking with Lyse Tele's quad play service. Hence, Tele Lyse's quad play users also become users of Network Norway. The "iMobil" service will require users to have WLAN capability in their terminals. According to a press release from Tele Lyse, the company will test "iMobil" until the summer of 2008.[3]

As of early 2008, quad play is still in an infant stage in Denmark and Norway. Although some multi-play services may technically qualify as quad play, it is still a far cry from what is envisioned in various scenarios of FMC. What constitutes the mass of multi-play in Norway and Denmark is triple play in some variety; however, because "triple play" is not a category in all official statistics, no exact comparative figures on the dissemination of triple play exist. Below, some facts and figures that may in an indirect way elucidate this will be presented. The status of broadband diffusion is strategic for understanding this and the presentation starts with this topic. Following this, issues related to regulations and policy are presented and discussed.

Broadband in Denmark

By end 2007, there were almost 2 million broadband subscriptions in Denmark. This corresponds to 36.1 broadband subscriptions per 100 inhabitants, which is the highest penetration rate in Europe. In other Nordic countries the equivalent figure is:

- Finland: 34,6 broadband subscriptions per 100 inhabitants
- Sweden: 31,2 broadband subscriptions per 100 inhabitants
- Norway: 30,3 broadband subscriptions per 100 inhabitants

Although Norway has the lowest broadband subscription density of these four Nordic countries, it is still above the EU average. Hence these countries, together with Netherlands, are characterized as the "most advanced countries" in Europe in terms of ICT. [4]

Table 1: Broadband subscriptions in Denmark and Norway, 2007

	Norway 2007[5]	Denmark 2007[6]
xDSL	1,040,759	1,206,862
Cable modem	205,256	541,708
FTTH	83,231	70,253
FTTx	n.a.	10,956
Satellite	n.a.	5

[3] Cf.: http://www.lyse.no/imobil

[4] Cf. Preparing Europe's digital future – i2010 Mid-Term Review, COM (2008) 199, SEC(2008) Vol 1,2, 3. April 2008, p. 56.

[5] *Source: Norwegian Post and Telecommunications Authority, cf.: http://www.npt.no/iKnowBase/Content/105175/tallgrunnlag_PTs_ekomstat07H_rev1107.xls*

[6] All Danish figures and tables in the paper are from 'Telecom statistics – second half on 2007', by the Danish NRA, NITA.

Power line	n.a	96
WLL	n.a	3,793
WiFi/WiMAX	30,669	19,204
LAN	2,627	124,469
Others	n.a	19
Total	1,362,542	1,977,365

Regarding the companies providing broadband connections in Denmark, TDC is by far the largest in the DSL area (68.8% by end 2007). The second largest is Cybercity with 17.6%, and thereafter comes Tele2 with 4.9% and Fullrate with 3.2%. In the cable modem area, TDC is also the largest operator with 43.0%. Telia Stofa has 28.7%, Dansk Kabel TV has 11.5% and Arrownet 8.9%. In the FTTH area, the picture is completely different. In this field, the broadband subsidiaries of the electricity companies dominate and TDC is not a player. TDC prefers to go for a combination of fibre and cobber in a VDSL solution. There is a wide range of electricity company subsidiaries in this field, and none of them has more than 12,000 broadband customers at the moment, but their ambitions are high.

In the WiMAX area (where there is no more than app. 13,000 subscribers all in all) one company (Danske Telecom) totally dominates with more than 90% of customers. There is, however, not much progression in this area at the moment.

The last area to be mentioned is 3G. After the 3G auction in Denmark, the only company that entered the market forcefully was '3'. They were more or less alone on the 3G market for 3-4 years. However, lately, TDC as well as Sonofon have also entered the 3G market. And, the low-price companies Telmore and CBB have followed suit. This has lead to a fast increasing number of 3G subscribers – not only for the 'new' companies in the market, but also for '3'. Ultimo 2007, the number of subscribers were 666,178. Not all 3G subscribers are, however, mobile broadband users (i.e. subscribers having used advanced data services within the last 3 months). Only half of 3G subscribers are mobile broadband users.

Broadband in Norway

For all intents and purposes, Norway as a nation now has full broadband coverage, because 99% of all households in the country should be able to connect to some type of broadband service, according to a study done in the summer of 2007, by the consulting firm Teleplan[7]. According to this study of the coverage potential, 93% of household in Norway may potentially be serviced by ASDL, 33% by CATV, 8% by FTTH and 13.5% by radio access broadband solutions. In Teleplan's study, broadband is defined as a medium that provides communication transmission equal to, or faster than 640 kbit/s. However, approximately 50% of the broadband subscriptions were to services of 2Mbit/s or above, and more that 95% were faster than 704 kbit/s. The term "broadband coverage" is an indicator of a potential. Hence the claim of 99% "broadband coverage" means that 99% of all homes and firms in some way or other have a potential or possibility to be connected to a broadband service, i.e. a measurement of the national broadband infrastructure. Although there has been a rapid increase in the number of households connected to broadband networks in recent years, the level of saturation was still approximately 60% (as of mid-2007). This figure is based on the assumption that there are approximately 2 million households/residential units in Norway and that at this point approximately 1.2 million households/residential units had some type of

[7] Cf.: *Bredbånd – Dekningsanalyse 2007* [*Broadband – Survey of coverage 2007*] – study commissioned by the Norwegian Ministry of Government Administration and Reform, downloaded from www.teleplan.no.

broadband service, according to Teleplan's study. As shown in table 1, there were 1,362,542 broadband subscriptions in total in the middle of 2007 in Norway. Approximately 10% of the subscribers were business firms and public organizations.

Two salient features are evident in these figures:

- Optical fibers and the concept of FTTH still constitute a small portion of the national broadband infrastructure. In reality, Tele Lyse is probably the only operator of some scale having an optical cable infrastructure in its local distribution network. The number of FTTH will probably increase in the next years because many energy utilities and CATV-operators are now deploying FTTH on large scale.
- The growth, or diffusion of broadband has been rapid. Starting from almost zero in year 2000, the growth in 2001-2002 was twofold. As typical of any successful, rapid initial diffusion dynamic, the rate of growth will gradually slow down: From 2006 to 2007 the rate of growth was "only" 21%.

The multi-play market in Denmark

The statistics on triple-play in Denmark say that by the end of 2007 there were 48,038 subscribers. Of these, half were customers of '3'. This means that in the triple play figures published by the Danish NRA, NITA, the mobile TV subscribers of '3' are included. This is in a sense reasonable, as '3' offers a platform for in-band mobile TV as well as Internet access and telephony (circuit switched as well as IP-based). This could be considered as a quadruple-play offer.

In the more traditional sense of the multi-play concept, the fibre-based solution dominates. This is the area in which the subsidiaries of the electricity companies are active. However, the solutions offered by these subsidiaries are generally not multi-play services in a strict sense. The electricity subsidiaries offer a communication path and cooperate with TV package providers, Internet access providers and VoIP providers, who offer their services on top of the fibre connection. The electricity fibre-subsidiaries are thus generally bit pipes. They do not offer a bundled package - although the range of service providers with whom they cooperate is limited.

Among the other initiatives in the multi-play area, the TDC-owned cable company, YouSee, has been offering a triple-play solution for the last year. Telia Stofa, which is one of the three large cable TV providers in Denmark, has also for a number of years been offering Internet access for its cable customers. And lately, Telia has come out with a double-play solution based on DSL. They are offering IPTV in combination with Internet access. This is a field where TDC also is planning to offer services via high speed DSL connections.

However, it would be an exaggeration to state that the multi-play market in Denmark is a burgeoning environment. There are potentials and initiatives. However, they seem to be constrained by, on the one hand, that cost effective technology solutions are developed – for instance the fact that TDC is not going for a full rate fibre solution but a combined solutions – and on the other hand that technology solutions and service offers are already available for delivering the services separately, which may be more profitable for the operators and service providers and even preferable for the customers, as they don't get tied into a bundled service offer. However, this may change once fibre has been more widely deployed and once speeds on DSL and cable modems have reached a level, where quality TV can be delivered.

The multi-play market in Norway

As shown, a substantial part of what constitutes broadband in Norway is mainly xDSL using the PSTN-infrastructure. The statistics from NPTA do not give any figures on the proliferation of VoIP, however, two figures may give an indication: In the first half of 2007, in the statistics on telephone subscriptions, under the category "broadband telephony", there were 421,190 subscriptions in this category. Of these, 11,819 were provided by the CATV. In general, as the total number of fixed telephone service subscriptions have declined gradually from year 2000 (there were 1,744,285 subscriptions this year) to 2007 (1,605,278 subscriptions), there has been a rapid growth of broadband telephony. Needless to say, the general slow decline in PSTN/ISDN-subscriptions is also related to a more massive diffusion and growth in subscriptions of mobile communications. In 2007, the figure for mobile telephone subscriptions was 5,210,608, i.e. 1.1 mobile telephone subscriptions per capita. As evident in telephone directories, many people have two or three mobile telephone subscriptions, but among infants and young children (e.g. under the age of eight years) and among elderly, the rate of diffusion is still low. There are no official figures on the status of 3G mobile communications (UMTS, etc.) in Norway, however, the assumption (or, guestimation) is that 5-8% of mobile communication is 3G/UMTS. This assumption is based observations of the number of mobile handsets sold with 3G functionality and the traffic volume in 3G mobile networks[8].

An increasing number of large CATV-operators, such as Canal Digital (subsidiary of Telenor) and Get (formerly UPC) are now promoting triple play packages to residential customers. Get has its own nation wide infrastructure based on a hybrid-fiber-coax network. It has gained a considerable market share with its triple play offer in residential areas in Norway's largest urban regions. Canal Digital is following a similar strategy with its CATV customers.

Policy and regulation

Regulation and policy in general do not seem to be major issues in this field – probably as multi-play has not been at the centre stage yet. This is clearly the impression that one gets from interviews with representatives of the IT and telecom associations in Denmark and Norway.

A potentially important issue is concerned with the problems for end-users in subscribing to a bundled service. There may be a danger of lock-in of customers. However, this issue is not taken up by the telecoms regulatory authorities in Denmark or Norway, as this is not considered to be a problem at the moment.

Rival or symbiotic development?

Marketing concepts such as "multi-play" and "triple play" or "quad play" may be viewed as rival concepts, however, these being promoted by actors who are still considered as "outsiders" in the telecommunication sector because of their identity as energy utilities or cable television network operators. In this landscape, the potential for radical bypass solutions are also present. Currently, the potential of WiMAX (IEEE 802.16) as a wireless infrastructure represents a real alternative, as evident in USA. Two companies, the gigantic Sprint Nextel of Reston and the startup company Clearwire, have announced that they will construct a large WiMAX-based network using the 2.5 GHz radiofrequencies in 2008.

[8] A common complaint often heard is that the UMTS coverage and reception in Norway is still poor outside downtown areas, e.g. in some suburbs of Oslo, UMTS does not work inside buildings, according to some users. Mobile operators claim the contrary.

According to their plans, these networks will cover a geographical area of 70 million people at the cost of USD 3 billion. Outside USA, in South Korea, deployment of WiMAX began in 2006 with the brand name of WiBro. In conjunction with this, Samsung developed and launched mobile PC that will work in a WiMAX environment. For this reason, development of complementary technology to the WiMAX system does not constitute barriers.

The WiMAX trajectory of development is, of course, also in rivalry with another trend: LTE, or Long Term Evolution promoted by the 3GPP community affiliated with ETSI, which is envisioned by its protagonists as the 4G successor of GSM/HSPA/UMTS trajectory of development. The latter has currently hegemony in Europe and regions in Asia, South-America and many other parts of the world, but not in USA and Japan. Although 3GPP is expected to complete its work with specification of LTE in “Release 8” in 2009, LTE is still an idea or a vision; it has not yet been implemented or deployed in any operation, in contrast to WiBro in South Korea or the WiMAX initiatives of Sprint Nextel and Clearwire in USA. However, given the economic and political strength of the actors represented in the 3GPP-movement and the vested interests they have in a developmental path for the present hegemony of GSM, one may expect that these actors will protect and promote vested interests in a developmental trajectory towards LTE as the desired course of development towards FMC. The development of LTE resembles the culture of NGN in the sense that both are promoted by the traditional telecommunications network operator community, both spell a “non-disruptive”, smooth and gradual transition from status-quo to something new and innovative, and, finally, both envision an all encompassing, total system. Needless to say, this implies a development that accords well with their interest. However, in this complex environment, there are obviously numerous factors that will shape and catalyze future development, in particular the future of multi-play and MVoIP. Of these, as evident in the WiBro-case of South Korea, political and regulatory aspects will possibly play an important role. In the next section, this will be the topic.

In most countries, there is a switchover from analogue television broadcasting to digital terrestrial television broadcasting (DTTB). The decision for this has been policy driven over a number of years. The switch to DTTB has been justified in terms of improved radio frequency management that will increase the number of television channels and in terms of viewers receiving improved signals, i.e. improved quality. Hence in an age of technological neutrality (cf. next section), this transition, which has been highly top-down, seem paradoxical, although in a technological perspective, the transition to digital technological solutions for television broadcasting seems very rational. The same policy paradox is also evident in the decision to adopt the various MPEG standards.

In the landscape in which the scenario of FMC is prominent, the future role of DTTB is considered a “dark horse” by experts because basically this system, as organized by national operators, may possibly become a competitor to FTTH and other cable based communication networks. Possibly, if DTTB becomes widely diffused, this may favour xDSL or WiMAX or other wireless solutions for DTTB customers, hence the diffusion of triple play and quad play may face serious competition.

Technological neutrality and network neutrality

The mantra among Nordic policy makers and the community of stakeholders in ICT is that policy should adhere to the principle of technological neutrality. This is in accordance with the ideological paradigm that was introduced in the mid-1980s as a result of deregulation and

liberalization of economic systems, in particular for the telecommunication sector. Adherence to the principle of technological neutrality is convenient for policy makers because most of them have little ICT-knowledge, i.e. most of them are unable to make technological judgments, recommendations or decisions. From a national technology policy perspective, one may suggest that adherence to this principle represents abdication in terms of making national technological strategies. In this perspective, the South Korean decision in 2005 to promote WiBro (WiMAX) and (presumably) encourage Samsung and other Korean companies to develop equipment for this, represents an interesting contrast to this principle because a government "picked a winner".

However, in redefining their role in ICT-policy adapted to a deregulated and liberalized market, policy makers view their role in terms of promoting the interests and demands of citizens and society to ICT, i.e. specify requirements, not how or by what means (technological solutions) these should be implemented. Basically, these requirements are:

- Robustness and vulnerability of systems and services so that they will function as expected and serve the needs of society in various critical situations (e.g. accidents, war, terrorist attacks, catastrophes, etc.).
- Enable fair competition among service and network providers so that costs are as low as possible and efficient in an economic system perspective. Competition is also considered important for innovations in service development and development of novel technological solutions, according to this tenet.
- Ensure fair access to ICT, e.g. Universal Service Obligation – USO, to all citizens.
- Ensure freedom of expression.
- Promote cultural and national identity (native language) and ethical values (curtail or ban immoral communication and information flow).
- Anticipate the evolution of mass media into two varieties of services: Linear (traditional broadcasting) and non-linear services (e.g. video on demand) – and the regulatory implications of this to the ideals of public broadcasting.
- Define a minimum of QoS-levels and enforce these and other aspects related to consumer rights.

In sum, the policy community shares a broad consensus on the merits and importance that ICT policy should be technology neutral, and that policy makers should not attempt to make decisions that in any way favour one type of technological solution to the detriment of others, i.e. policy should not "pick winners" – this should be done in competitive markets.

The issue of QoS and consumer rights is relevant for the concept of network neutrality. This term is more a de facto policy principle, or ideal, and also controversial. Basically, this involves consumer rights and to what extent telecommunication operators may differentiate or impose limitations on the use of internet and broadband, and more important, if they should discriminate (and charge more for) services that require specific QoS-standards. This question is relevant for a number of services, specifically for wireless voice telephony in order to reduce jitter and voice degradation, which is a real problem in all systems based on packet switching. Although this is not a big issue now, in the future this may become a barrier for the diffusion of many wireless services. Apart from policy implications, there are non-trivial technical implications related to how a telecommunications system, which is becoming more and more uniform because of a common IP platform, should manage this type of differentiation. In Norway, the topic of network neutrality became a controversial issue in

2007 because Telenor broke off its contract with NIX – Norway Internet Exchange.[9] Telenor claimed that many ISPs were free riders to this system, pointing to the company Schibsted that generated 250 times more traffic from its system than from Telenor's, implying that Schibsted reaped substantial commercial benefits from a system that was initially based on reciprocity. This controversy points to potential conflicts between various actors within the system. In a regulatory perspective one may suggest that this is not a big issue for consumers in Europe, because, according to the EUC, consumers are basically free to choose among many different internet service providers. Hence, the problem of lock-in is not perceived as important. On the contrary, some European regulators think that network differentiation may be beneficial because pricing mechanisms may serve as an incentive for increased efficiency and competition.

Diffusion of broadband: Two different strategies

In the zeitgeist of the dotcom period (approximately 1995-2001), the scenario of a future Information Society was prominent. In this, building broadband infrastructure became an important political issue in most OECD member countries. This was seen as an essential prerequisite for an imminent emergence of a new techno-economic paradigm based on the foundation of a "new economy". Usually in political debates, there was broad consensus on this goal: Building a broadband infrastructure was seen as a high priority, for many this was the most important national policy issue. Nevertheless, the topic of *how* this should be done and what type of governance and institutional model should be applied to this became an area of disagreement.

One point of view was that the state, or an agent of the state, should plan, construct and operate this type of national broadband network and infrastructure, as a public good. Advocates of this type strategy argued that because of the risks involved and prospects for market failure, the market would not be capable of doing this type of task, in particular private investors would shy away from constructing networks and provision of services to rural districts and to economically less privileged groups in the population. In addition to this, they pointed to national security, lock-in problems, and issues related to vital cultural values which would be easier to enforce in an infrastructure controlled and operated by the state. The other, opposite strategic direction advocated that the market and private actors would automatically invest in and operate the future broadband infrastructure if the framework conditions were normal. Hence, they claimed, this would be much more efficient and flexible. Although protagonists of this strategy also recognized the possibility of market failure and the importance of "vital" national interests, they argued that these could be counterbalanced by policy measures that were specifically designed to address these issues.

With respect to the take-up and establishment of broadband access networks, the policy of the Danish governments for the past decade has been non-interventionist. When compared to the other Scandinavian countries, the broadband policies in Denmark are clearly on the liberal side. Although the establishment and extension of the research and education network in Denmark, at a point of time, was important for the extension of Internet access, there has been very little economic support on the supply side from public authorities at all levels for broadband development. On the demand side, however, there has been and is an important economic support. The Danish tax laws allow for a large range of fringe benefits for employees. These fringe benefits are deducted from the salaries of the employees. This, however, means that the state pays for app. two thirds of the price of the fringe benefits

[9] Cf.: http://forbruker.no/digital/nyheter/data/article1903858.ece

(including broadband access), as the top tax in Denmark is around 65%. In the statistics published by NITA, it is shown that 18% of all broadband connections are sold to and used by business; almost 60% are sold to and used by households, while a little more than 22% of broadband connections are sold to business and used by households. This constitutes a considerable contribution to the take-up of broadband access.

In Norway, a market oriented strategy was enacted because at the time (1999) a coalition of liberal-conservative political parties held office in the government and had a majority in the parliament, the Storting. Parallel to this, they allocated funds to a demonstration program, HøyKom, for co-funding a number of broadband deployment projects in public schools and institutions. In the period 1999-2007, the government spent NOK 573 million (Euro 71.5 million) on this program. As explained earlier, the broadband infrastructure in Norway now has a 99% coverage. Hence the basics of the goals have been attained, demonstrating that the market oriented strategy was successful.

The Swedish broadband approach, which as enacted from 2001 with substantial government funding (Euro 588 million), represented the opposite strategy compared to Norway and Denmark. In 2001, Sweden was ruled by socialists. According to a report[10] by the Swedish Post and Telecom Agency (SPTA), the broadband coverage in Sweden in 2007 was 99%, i.e. identical to the broadband coverage in Norway and Denmark. Although the Swedish broadband system has a much larger proliferation of FTTH (29% coverage), which may be an asset in terms of a future potential, Sweden, Denmark and Norway have obtained its goals by means of two different strategies.

What is perhaps most interesting is the success of Denmark's and Norway's strategy, which many experts in 1999 feared would fail, suggesting that ideological blinders (liberalism) made these plans unrealistic. The success of this market oriented policy and strategy may explain why policy makers now seem to accept the tenets that policy should be technology neutral. Hence, the role of the state as a leader, coordinator and builder of ICT systems has been delegated to the actors in a market environment. As a consequence of this, the relationship between actors in the market in terms of interconnection and business models that impinge on these will become an area for building new types of institutions and governance models in order to create an environment for efficient competition.

Radio frequency allocations and wireless access networks

In 2001 when the first licenses for UMTS were given by governments, these were allocated to operators on "beauty contest" criteria in Norway and Sweden, i.e. those operators who promised to build what was considered the best networks were given licenses. In contrast, in Denmark as in Germany and UK and many other countries, similar licenses were auctioned off and the governments reaped billions of Euros for these. Shortly afterwards, the dotcom bubble burst and the exorbitant prices paid by many of the mobile communications operators created severe economic crisis in these companies. At the time, the Norwegian policy was praised as "sound" and "wise". Now, seven years afterwards, it is difficult to see if the "beauty contest" policy really was as beneficial as proclaimed because the diffusion of UMTS has been slow and many of the beauty contestants have turned in their licenses.

The radio spectrum is a scarce natural resource and allocation of this should be done in a manner that maximizes this as a public good. This may explain why the principle of

[10] http://www.pts.se/upload/Rapporter/Internet/2008/Bredbandskartlaggning_2007_2008_5.pdf

auctioning of radio frequencies has now become more interesting. In the period after the dotcom crisis, new technological solutions, specifically WiMAX, have become more mature, hence, there are many contestants to the use of radio frequencies. In particular, the switchover to digital terrestrial television broadcasting has made large blocks in the spectrum vacant. In this perspective, policy makers will consider offering this in auctioning, in order to develop a pricing mechanism for the system. This way of thinking now seem to be implemented in the management of radio frequencies, as evident in the recent auctioning of licenses in the 2,6 GHz band.

MVoIP

Introduction

In this section, the structural aspects of the development of mobile voice over Internet Protocol (MVoIP) are examined and two country cases, Denmark and Norway, are briefly presented. The basic structural aspects discussed are 1) technology development, including the development of standards, 2) market developments, and 3) regulatory developments. These three broad areas are examined separately in the text though it is clear that they are strongly interrelated. Such interrelatedness applies in all fields, and the purpose of the section is to examine the specific interrelatedness between the technology, market and regulatory aspects in this specific market segment.

Fixed VoIP solutions have been on the markets for a number of years and have already acquired a sizeable and growing share of the voice markets. MVoIP is a newer field and denotes VoIP being delivered on mobile platforms. At present, the number of users of MVoIP solutions is relatively low, and the aim of the present section is to examine the structural factors that may influence the development of the MVoIP area.

Technology aspects

There is no dominating technology solution for MVoIP on the market or on the way to the market. Different competing solutions are found, and the market is still so immature that it is not possible to determine whether the market will be dominated by a single solution or whether many different solutions will so-exist. The likelihood is, however, that different solutions will co-exist, as they partly cover different needs of users and market strategies of companies operating in the markets.

To simplify the presentation of the different technology solutions, which are relevant for MVoIP, three different layers should be touched upon. The first layer is concerned with the applications, where three different technology solutions are often dealt with: The older H323 ITU protocol, the SIP IETF protocol and the proprietary protocols like Skype and Google Talk. The second layer is concerned with the platform level, where the question is basically whether open IP is used or whether services are delivered on the basis of an IMS platform. The third layer has to do with the more basic network solutions applied, WiFi or WiMAX networks, or the data channels of mobile networks, or a combination as in the case of UMA, which combines a cellular solution and a WiFi solution.

With respect to the application layer, the H.323 protocols of the International Telecommunication Union (ITU) was the first one (1996) on the market but has never acquired any large following. Far more successful has been the Internet Engineering Task Force (IETF) Session Initiation Protocol (SIP). This is the protocol used by most VoIP providers and is also likely to have a following among the future MVoIP providers. In

addition, there are different proprietary protocols of which Skype is far the most successful. This applies in the fixed VoIP area and also seems to be the case in the mobile area. The operator '3', has, for instance, implemented the Skype solution into its X-Series solution and has also launched the mobile Skypephone.

Regarding the platform level, the major issue is whether open IP is used or whether the IMS (IP Multimedia Subsystem) platform is introduced. IMS is the preferred platform of traditional mobile operators. It is a platform, which allows for a control of the level of QoS (Quality of Service) delivered and allows for a differentiation between, for instance, the IP-based services delivered by the mobile operators themselves and the services delivered by independent third parties without QoS assurance. The services delivered on the IMS platforms allows for a differentiation between best-effort third part services and services, which has the QoS assurance of the mobile operators.

Concerning the more basic network solutions, VoIP can be delivered via WiFi networks or via WiMAX. However, far more debated has been the MVoIP solutions delivered via the data channel of mobile networks or via a combination of a circuit switched cellular channel and a WiFi channel. This last-mentioned solution is mostly called a UMA (Unlicensed Mobile Access) solution, as it uses unlicensed frequencies when relying on WiFI access. The mode of operation is that when the user is in the vicinity of a WiFi network (for instance at home), the WiFi connection is used, and when outside WiFi reach, the traditional circuit switched cellular network is applied. Furthermore, there is seamless handover between the two networks so that the user will not observe when switching from one network to the other. TeliaSonera, for instance, has been marketing such a solution under the brand name, Home Free and in the "iMobil" service of Lyse Tele's quad play offer.

There are clearly many different combinations of these solutions on the different layers. 'Naked SIP' is, for instance, a term used for a SIP solution delivered on an open IP platform, while the SIP protocol also can be used in a more closed IMS environment. SIP can also be used for a cellular data channel solution, while in the case of X-Series delivered by the operator '3', it is a Skype solution which has been implemented.

The technology solution chosen is primarily determined by the business strategy of the operators in question. The Skype solution implemented by '3' is presumably chosen for its marketing purpose, i.e. for developing the '3' brand and connecting '3' with the strong Skype brand in a situation, where '3' has been fighting just to get the 3G market kick-started. The UMA solution chosen by TeliaSonera is much more determined by be aim of maintaining and expanding the number of traditional cellular customers in the face of stiff price competition on cellular mobile communications.

Market aspects

Within a time frame of approximately 5 years, fixed network operators will close down their PSTN (Public Switched Telephone Network) operations, and voice services will be either IP-based or mobile – or a combination. It is difficult to imagine that the combination of mobile and IP will not play a major role in the coming years, also for voice services. Such a 'prediction' is based on the steeply growing capacity of the cellular data channels with HSPA (High-Speed Packet Access) and the LTE (Long Term Evolution) development and the growing diffusion of WiFi and also WiMAX.

It will, however, take some years yet for technology reasons, but primarily for market reasons. The technology reasons are that competitive technology solutions still have to be fully developed. Users have become accustomed to total coverage and seamless handover (service almost everywhere), and services at a lower quality level have a hard time competing. The market reasons are that most of the existing telecommunications network operators have very small incentives to launch MVoIP, as it cannibalises on their existing mobile voice services. However, this may represent opportunities for new entrants, typically operators of quad play services.

The basic competitive situation on the mobile voice market is that coverage is almost 100% and that prices have reached a level so low that not only have the number of mobile subscribers long time ago surpassed the number of fixed line subscribers, but the number of minutes generated from mobile terminals have also in many country cases passed by the number of minutes generated on fixed terminals.

However, in spite of the quickly growing number of minutes generated on mobile terminals, the average revenue per user (ARPU) is decreasing. This illustrates that there is a sharp competitive situation on the mobile voice markets, and that the window of opportunity for MVoIP is relatively narrow, at the moment. New MVoIP operators have to compete on a market where users are accustomed to relatively high quality services at relatively low prices. And, existing mobile operators have very little incentive to undermine their own circuit switched mobile operation, as this is still the cash-cow of mobile services in spite of decreasing ARPU. In spite of this, expert informants expect a radical decrease in the price level of mobile services in the future.

MVoIP is a technology which, to a large extent, is an example of a disruptive innovation – in the Christensen (1997) sense. The quality of the service is, at present, lower than the dominant existing mobile voice service; there are, however, development potentials, for instance the possibilities for combining voice services with data services on the data channel; and, the costs of delivering the service is potentially lower than for circuit switched services.

In the long run, MVoIP should be able to out-compete traditional circuit switched mobile voice services. We are thus in a phase of trial and error, and, in contrast to what the Christensen theory on disruptive innovations says, the successful models can just as well be developed by existing/incumbent operators as total newcomers. UMA solutions may develop into successful solutions in an intermediate phase between the existing dominant circuit switched phase and a future all-packet switched phase. At the moment, however, there is not any apparent success – the reason probably being that the prices of circuit switched mobile voice have become so low that a UMA solution does not constitute any decisive move. Third party naked SIP solutions via cellular networks can also become viable and competitive solutions. The actual capacity on the mobile networks is, however, generally not presently sufficiently high to secure a high quality service. SIP solutions on WiFi and/or WiMAX can also develop into successful services in the future, but the coverage of especially WiFi networks but also WiMAX networks is a question to be resolved. Finally, an IMS-based solution presently seems like a potentially successful model. This entails a continued control by the network operators and, therefore, also a control on the revenue. Such a service, however, cannibalises on the circuit switched operations and will only be forcefully launched when a viable business model is found, combining voice and other services, and finding a manner of charging such a service in a profitable way.

Regulatory aspects

Traditional sector specific telecommunication regulation includes three major regulatory areas: competition regulation including interconnection, rights of way regulation including access to frequencies, and universal service regulation. There is, presently, no sector specific regulation either hindering or promoting MVoIP developments decisively. However, situations may later arise where regulatory decisions have to be made.

There is sector specific regulation for interconnection in the mobile field. The cellular mobile area is included in the market analyses determining whether there is Significant Market Power (SMP). To the extent that the SMP conditions are not met, alternative operators still have access to the network facilities of the existing network operators. A question that could arise would be the access of alternative operators to the QoS-controlled IMS area. This question could resemble the American discussions on network neutrality, i.e. whether network operators have the right to offer lower quality services to third parties than to the conveyance of services delivered by the network operator itself.

The frequency question is probably the potentially most important one in connection with MVoIP. If services are delivered on WiFi networks, there is presently no regulatory issue, as WiFi is license exempt. WiMAX, however, requires frequency licenses in some frequency bands, and this could be an issue if WiMAX becomes an important platform for MVoIP. In Denmark, two WiMAX licenses were assigned a few years ago. One of them went to an active WiMAX operator, Danske Telecom, while TDC acquired the other license. It, however, seems that this license was primarily acquired to be used ‘in case’. TDC has not yet used its license and the main result has been to exclude another operator from starting a WiMAX operation. In Norway, a similar development has occurred, which may explain the low proliferation of WiMAX in Norway.

The last sector specific regulatory area is concerned with universal service. Present universal service regulation encompasses fixed telephony services and fixed telephone networks (PSTN). Although a growing number of users rely solely on voice delivered on mobile networks, there is no universal service provision on mobile communications. This issue has, actually, been considered by the European Commission, but the conclusion was (in 2005) that mobile communications were already too widely diffused (around 100% of the population) to make a universal service provision relevant. It may be that universal service in a coming round of universal service reviews will be extended to broadband access. Should this become the case, universal service will be changed from a service (telephony) and its dedicated network (PSTN) towards broadband access, pure and simple. This could strengthen the general VoIP development and subsequently also the MVoIP development. But again, this is a very indirect effect.

The last issue that merits mentioning is general consumer protection. General consumer protection also applies to telecommunication services including MVoIP. This could affect the development of MVoIP, as some MVoIP solutions most likely will be of a markedly lower quality than existing voice solutions. This could contribute to a slow diffusion of MVoIP solutions.

In connection with the research phase for this paper, three representatives of Danish IT industry organisations[11] were interviewed and so was the Danish NRA, IT- og Telestyrelsen. In none of these interviews were any serious current regulatory issues regarding the development of MVoIP pointed at. The issue of MVoIP had not specifically been on the agenda in these organisations. In one of the organisations (Telekommunikationsindustrien), however, VoIP in general has been on the agenda. The concern has mostly centred on the issue of Quality of Service (QoS) and the need for developing standards for the interconnection between different IP based systems. In a managed IP system, QoS can be maintained at a high level. However, on the open Internet and when interconnection between different managed systems, there are quality problems. This applies to VoIP in general, and applies even more to MVoIP, as this kind of VoIP, moreover, is transferred via a radio link with the specific problems that this entails – This was the viewpoint expressed. This also leads to a potential regulatory problem, namely the extent to which third party operators should have access to the QoS control of network operators – as mentioned above.

From the other interviewees, most emphasis was on the market aspects of the development of MVoIP. However, the representative of ITEK also put much emphasis on a 'past' regulatory issue, i.e. the high prices charged in the Danish 3G auction. According to ITEK, the high fees have been a serious problem for the development of 3G in Denmark. In a long period after the assignment of 3G licenses, it was only the operator '3' that marketed 3G services. They only have a 3G license and have, therefore, not had the possibility to rely on a 2G license. Only within the latest one to two years, has there been any serious growth in the Danish 3G market. This has contributed to holding MVoIP back – as it has held back all other packet based data services on a 3G platform.

Another issue mentioned by the ITEK representative is the lack of viable business models for the delivery of packet based services. The problem - as they see it – is that the telecommunication operators cannot charge the customers sufficiently in an Internet-like environment. This is the reason why operators are working on IMS or other quality controlled models, where the customers can be charged for services.

All in all, however, the regulatory aspects do not seem to be the most important in the case of MVoIP. Technology development is important, but the primary factors affecting MVoIP developments are market factors and company strategies.

MVoIP in Denmark

MVoIP has not really taken off in Denmark. The two major operations in the field, Skype via X-Series and 3 Skypephone of the operator '3' and the UMA solution by Telia named Home Free, have already been mentioned. The Skype solution '3' started in 2007, but did at first not at first include Skype In or Out – only the Skype-to-Skype solution. Later, Skype Out has been included in the service. The Home Free solution by Telia was launched in the autumn of 2006, but has never become a decisive feature in the portfolio of mobile services by Telia. In addition to these larger initiatives, MVoIP can also be executed using, for instance, Fring software. However, all in all, it has to be concluded that MVoIP has not yet any substantial following in Denmark. The incumbent operator TDC is preparing for the possibility of offering MVoIP, among other services, on an IMS platform. However, at the moment this is in the planning phase.

[11] The IT industry organisations interveiwed are ITEK, the IT branch of Dansk Industri (DI), IT Brancheforeningen (ITB), and Telekommunikationsindustrien (TI).

The last point to be mentioned here is that the planned strategies of operators involving MVoIP are directed at the business users primarily. MVoIP will be offered to business customers in a package so that voice services can be integrated with data services. This is thus a strategy for including MVoIP in a quality package product. The primary aim is not to deliver cheap voice services but to deliver an integrated package. It is, of course, also the aim to deliver services at competitive prices to business customers who have high mobile bills from communicating when travelling abroad, etc. But it is not primarily a price-oriented strategy but a service package strategy. This fact points in another direction than the Christensen-based discussion on disruptive innovations, where the focus is on low-end users and new-comers. The question is whether such a strategy will succeed.

MVoIP in Norway

The situation in Norway is not substantially different from Denmark. MVoIP has not either taken off in Norway. The small operator Hello has started offering an UMA solution, and the same applies to the company Phonzo. Moreover, Telio launched a MVoIP solution for business customers in the end of 2007. Furthermore, as in Denmark, the Norwegian incumbent Telenor is building an IMS platform which will allow for offering MVoIp services along with other data-based services.

3G services have been relatively slow to take off in Norway – as in Denmark. Lately, however, 3G has started developing fast in Denmark and probably also in Norway, although Norwegian statistics do not single out 3G as a specific category.

A possible difference between Denmark and Norway could be related to the development of WiMAX. WiMAX does not seem to develop fast in Denmark. The number of WiMAX subscribers has been constant for the past year in Denmark, while WiMAX may have larger potentials in Norway because of the geographic conditions in Norway. However, so far (2008) WiMAX has not developed as much as expected a few years ago.

Summary of MVoIP

The development of MVoIP has vast potentials, as it is based on two technologies, which increasingly have dominant positions in telecommunications, mobile and IP. At present, however, MVoIP has not really taken off. When examining the different aspects that traditionally affect the development of all services, including telecommunication services, i.e. technology aspects, market aspects, and regulatory aspects, it is clearly the market aspects, which are presently the most important for the development of MVoIP. Technology aspects are also important, as MVoIP technologies still are in the development phase. However, the strategies of operators and especially the strategies of incumbent network operators and their concerns regarding the cannibalisation of their own circuit switched services are of crucial importance for the MVoIP development. The strength of this factor should be recognized because these seem to be working systematically according to the scenarios set in the vision of LTE.

Discussion

In a recent article, the industry analyst Arthur M. Hughes posed the question of “Is the Triple Play Working”. The answer for the time being is yes, but only for CATV operators. In summing up, he suggests that the reason for this is that “…selling the triple play including TV for telephone companies is expensive and very difficult. For cable companies, it is

comparatively easy. Where Telcos are accomplishing the triple play, however, is with wireless" (Hughes, 2008).

A salient property of ICT and its evolution towards systems and networks that are completely based on IP technology is a dramatic increase in efficiency and, hence, products and services that have decreasing, nearly zero, marginal costs. Economies of scale are increasingly embedded in technological solutions and standards that have low appropriability, e.g. standardized technology platforms. These tendencies are reinforced by regulations designed to stimulate competitive markets. Increasingly, value creation has become a game of creating economies of scope. This entails various strategies for reducing customer churn while simultaneously obtaining what the industry often euphemistically call "customer loyalty", or more aptly, that lock-in of customers has become important in order to maximize ARPU (average revenue per user).

If these assumptions are valid, actors will increasingly search for – and develop – business models based on product and service concepts that will promote economies of scope, because the demand-side of the markets has now become essential for value creation. However, both strategies will ultimately depend on the type of value proposition industry actors are capable of offering, and, more crucially, how customers and users perceive, interpret and assess these. This will then enter into their opportunity judgement, however, one may assume that the notion of satisficing (Simon, 1969) is important, and their perception of transaction costs involved in a choice or non-choice (the latter may be important for understanding the mechanism of lock-in) also enters into this. These aspects are increasingly reflected in current thinking on new product development (Robert G. Cooper, 1996; Robert G. Cooper, Edgett, & Kleinschmidt, 2000), reflecting the influence of mainstream diffusion theory, i.e. that the customer value proposition should consist of a broad range of benefits. Consequently, the idea of "packages" and "one-stop-shopping" has become a norm, and with this, various strategies for rebundling services are now being attempted, e.g. multi-play.

Needless to say, some aspects of economies of scope are structurally inconsistent with the aims of competitive markets that most OECD member countries are now attempting to enforce in regulations. These regulations are aimed at obtaining maximum economic efficiency and social welfare by means of competition. In this, lock-in or other attempts at creating de facto monopolies are antithetical. SMP-regulations and consumer rights such as "number portability" are typically designed to counter such tendencies. In obtaining market power, control – usually by means of ownership – of ICT infrastructure plays an important role in lock-in strategies. In the present perspective of 2008, the scene and structure is governed by basically three types of infrastructures, with associated stakeholders controlling these:

- wired networks that have evolved from cable television networks and electric power distribution networks,
- networks that are based on PSTN and its twisted copper wire in the local distribution network,
- wireless networks in which allocation of radio frequencies are fundamental.

All of these infrastructures are now capable of – or have a realistic potential for – providing most of the ICT services that exist now because limitations in transmission bandwidth are increasingly being solved by new technological solutions, standards and configuration of networks. In this, the position of wireless networks and solutions have the advantage of flexibility and potential for rapid deployment, however, this type of infrastructure may have

limitations in capacity and QoS that may ultimately demand high investment costs and complex system architecture.

Economies of scope and the related issue of vertical integration (but also horizontal integration when different kinds of networks are involved) are two of the traditional issues in structural analyses of markets. Economies of scope, in the common use of the concept, means that there are positive returns to scope on the production side from a unified production of goods or services, which are complementary or otherwise related to one another.

The question of economies of scope is obvious in the case of multi-play and can also be posed in relation to MVoiP, i.e. whether there are economies of scope in offering MVoIP together with other services, including platform services. Are there any economies of scope and integration or are other mechanisms at work in these two areas (multi-play and MVoIP)?

Formerly, communication services were produced and delivered in vertically integrated silos: telephony on PSTN and TV on cable networks, for instance. Presently, communications has become much more layered and different services are provided on the same IP network. This should imply that there are lower vertical economies of scope than formerly, while there may possibly be higher economies of scope in integrating different kinds of networks horizontally.

With respect to the vertical dimension, there will still be external transaction costs related to interacting between different players, even when technology allows for a more layered structure. On the other hand, there will also be internal transaction costs in integrating different production cultures, as is the case when integrating telecommunications and content production and delivery. For a number of years, these are issues that communications companies have been struggling with – and it still applies. It is not clear whether there is an optimal industry structure in the area and what that optimal structure would be. There is a high degree of trail-and-error in the area.

In the 1990s, with the liberalisation of telecommunications and technological convergence, the notion of ‘content is king’ became popular. Following this, the strategy of operators should be to ‘get up un the value chain’, i.e. to get involved in content production and delivery and to avoid becoming a ‘mere bit-pipe’. In the trial-and-error process at this point of time, the Danish telecommunications incumbent failed, while Telenor seems to have been more successful.

In the Danish context, presently, the electricity companies, which are active in deploying fibre to the home, have up until now chosen a strategy where they deliver the connection (the bit-pipe) and leave the delivery of television, Internet access, and telephony to (a limited number of) companies with whom they cooperate. This is probably a reflection of a realisation that the core competences of electricity companies are not in content and communication – at least presently. They are satisfied with being ‘mere bit-pipes’.

There also seems to be a realisation among industrialists in the communications area that money can also be made without being the content provider. While formerly, representatives from industry organisations would support the ‘content is king’ thesis, there seems to be a growing conception that it is in the organisation of services and content that money can be made. Focus is, therefore, on providing platforms for services and content, and the main strategy of incumbent operators is presently to establish IMS (IP Multimedia Subsystem) as the platform for service and content delivery.

Emphasis is thus on being the one that retains the customer contact and being the one that sends the bill. This is the central focus of the traditional communications industry and has been a concern since the growth of Internet. Traditional telecommunications operators have seen Internet as a real threat, as Internet is an open platform with a layered structure with a split between access providers and content and service providers. This has forced telecommunications operators to find alternative business models, where operators still may have a central position. The struggle is, so to say, about being the 'spider in the net' – the player that controls the customer access in relation to the other players delivering content and services.

It is in this light that many of the initiatives from the traditional players in the telecommunications area regarding multi-play and also MVoIP can be seen. It is difficult to make a clear case that there are economies of scope in the traditional sense of the term in multi-play and MVoIP. Multi-play is, to a large extent, about locking in customers by offering packages of services where there are switching costs for customers in changing the providers of one or more of the services, which are included in the package. Another expression of the same is that it is all about creating customer loyalty and limiting churn of customers.

The bundling strategy, however, presupposes that there are advantages to be gained for customers in buying bundles of services instead of acquiring services separately. Two types of advantages are feasible. One advantage has to do with the ease of buying an arranged bundle of services and not having to worry about subscribing to different providers and setting up different solutions on your own hand. Another advantage is concerned with possible discounts. On the other hand, customers are also concerned with being dependant on just one provider. This is the reason why we see bundled offers tailored to suit tastes of specific groups of customers with the aim of gaining customers or retaining customers in different fields.

In all this, it however seems that the 'game' is on the customer side and not on the production side. Apart from CATV-operators, it is difficult to make a clear case that there are economies of scope on the production side in multi-play and MVoIP combined with other data services. It can, however, be argued that there are economies of scope for customers (discounts) and too high transaction costs in buying services from many different providers. The economies of scope thus seem to be on the consumption side. To paraphrase the concept promoted by Shapiro and Varian in their 'Information Rules' book regarding demand side economies of scale, one could say that there are demand side economies of scope in bundled services. This applies to multi-play but also applies to MVoIP when MVoIP is offered on an IMS platform together with other data services.

Conclusion

According to OECD's *Communications Outlook 2007*, the most fundamental and important driver in ICT development is voice telephony: "Voice has been, and still is, the key driver for the telecommunication business" (2007, p. 18). This, they suggest, may explain why the telecommunications market has attained a worth of over 1 trillion USD in annual revenues. Although this figure is impressive, a closer look at consumer spending provides a different picture. According to the abovementioned OECD study, the percentage of final consumption expenditures that households in OECD member countries spend on communications (which also includes expenditures on equipment and postal services) was 2.3% in 2004. This is not

much, however, the share of communication has increased from 1.8% since 1991. The 2004 figure of 2.3% translates into USD 1,054 (OECD, 2007, p. 32). Compared to 1991, consumers now reap a substantial consumer or welfare benefit; one may be tempted to call this a gigantic, historical “free lunch” because they now obtain a broad range of new, high quality services to a comparatively much lower price. Still, the OECD-figures are sobering, because they show that the telecommunication market is an arena of competition and business opportunities where households – on average – are willing to spend only a little bit more than USD 1000 a year. By comparison, a household would probably spend more money on milk or beer. In this perspective, the ICT-market for services seems like a zero-sum game.

As shown, analysis of the present situation of multi-play and MVoIP does not give a clear indication of the direction of future development. The “dark horse” in this may be the development of broadband wireless solutions and the market demand for mobile communication services based on these. In USA and some Asian countries, WiMAX-based services seem to have promising future. In the rest of the world, the evolution towards LTE – in which telecom incumbents have a hegemony – seem at present to have most success. The latter has a strong base because of the success and hegemony of GSM and its current evolution to 3G. Outside the domain of GSM, other solutions seem more promising. However, just as the case of internet has shown, if successful, an innovation has a good chance of success.

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