Broadband market success factors
– what determines a successful broadband market?

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Foreword

This thesis is dedicated to our families who have given us unconditional help and support through our time at KTH and during this thesis.

We would like to thank our thesis advisor, Anders Berglund and our examiner, Lars Hagman at the Royal Institute of Technology in Stockholm, Sweden, for their guidance and help throughout the work.

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Other people who have helped us in different ways and who we would like to thank are:

Sammanfattning


Till grund för denna utredning undersöktes och utvärderades en grupp utvalda länder som anses ha en framgångsrik bredbandsmarknad (däribland Sverige). Utöver det gjordes en undersökning av en grupp länder i MENA-regionen som av olika anledningar var intressanta för undersökningen eftersom de befinner sig i ett tidigt stadium av fasen för bredbandsutveckling. Avslutningsvis utfördes intervjuer med några av Sveriges ledande internetleverantörer, Post och Telestyrelsen samt infrastrukturbolaget Skanova.

Benchmarkländerna inkluderar Sverige, Frankrike, Kanada, Sydkorea och Japan. MENA-gruppen inkluderar Egypten, Iran, Qatar, Förenade Arabemiraten, Jordanien, Turkiet och Saudiarabien. Utredningen bestod av statistik från olika källor, rapporter från analysbolag, teorier från litteratur samt diskussioner med Ericssonanställda. Alla länder i MENA-undersökningen visade sig vara i varierande situationer vilket underlättade att särskilja olika faktorers påverkan.


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1 Mellanöstern och Nordafrika
Abstract

This master thesis is written at the Royal Institute of Technology during the spring and summer of 2008. The assignment was to investigate what factors on a broadband market determine how well it performs in terms of how many people have access to broadband. These are the factors that determine whether or not a country or market will be able to achieve a high broadband penetration. The purpose of this thesis was to establish a better understanding for what a market should look like or how a struggling one can be complemented in order to succeed.

As a foundation for this investigation, a group of benchmark countries were chosen and evaluated. In addition to this, a group of, developing MENA\(^2\)-countries were chosen and evaluated. Finally, interviews were performed with some of Sweden’s leading internet service providers, the regulatory agency and infrastructure company, Skanova.

Among the benchmark countries were Sweden, France, Canada, South Korea and Japan. The MENA countries included Egypt, Iran, Qatar, United Arab Emirates, Jordan, Turkey and Saudi Arabia. The investigation included statistics from various sources, reports from analyst firms, as well as theories from literature and discussions with Ericsson employees. All the countries in the MENA study turned out to have very varying situations which made it easier to distinguish effects of different circumstances.

Many factors affect the penetration levels in different ways. For prices to match the market’s ability to pay, open competition must exist. The level of competition is closely affected by the level of regulation from an independent regulator, making sure no player abuses a position of unusual power. An understanding from the government of the benefits of broadband is invaluable for establishing a stable foundation. Government actions have proven successful in both raising PC penetration and building solid infrastructure.

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\(^2\) Middle East and North Africa
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1 Introduction
Broadband is a common name for technologies which offer high speeds to consumers to be used for various reasons. It may be used for surfing the Internet, streaming videos and music, playing computer games online, for telephony and for TV broadcasting. In a world where the masses are craving more and more information, faster and faster, broadband is the solution. Therefore it is interesting, from an equipment vendors and from a socially beneficial point of view, to understand what defines a successful market. What is needed for emerging markets to become successful, and how can this be realized? At the moment there aren’t any specific given factors to describe a successful market, but this study intends to establish these and present them.

1.1 Problem description
The problem formulations which are the cause for this thesis are mainly:

- How is a broadband market affected by different factors?
- What factors play a central role in different types of markets (monopoly, special economic circumstances etc?)
- Why are some markets performing better than others?

When speaking of a successful broadband market a market with high broadband penetration\(^3\) is referred to. Broadband is revolutionizing the way business’, communities and people work.

1.2 Purpose
The purpose of this thesis is to get a better understanding of which factors are excelling a broadband market, or more importantly, which factors may be preventing a broadband market from excelling.

1.3 Delimitations
It is desired to understand, as entirely as possible, what factors determine the success of a broadband market. The depth of such a study could be potentially endless and it is therefore necessary to limit the scope to a realistic size, proportional to the time and resources available. The ideal case for a study like this one would be to closely examine the technologies available, the social and economic theories that can be applied to the subject and then compare them to the real life situation in the different countries of the world. Since up to date statistics are difficult to come by and need to be critically examined, it is expected that only a select number of countries can be examined. Two main groups of have been selected; benchmark countries that can tell a story of success and the countries of the MENA region. The MENA region was included because it is an area that is relatively underdeveloped but continuously evolving. Some of the countries in this region are even experiencing the fastest broadband growth in the world (Parry, 2007, p 4). Other countries in this region have abnormally low internet penetration relative the average income, which the authors hope, will display other factors than the most apparent, financial ones. It is also important to point out that this report only aims to investigate what determines a successful broadband market from an equipment vendor as well as a socially beneficial perspective and not from an ISP\(^4\) perspective.

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\(^3\) Penetration refers to a certain percentage i.e, people or households.

\(^4\) Internet Service Provider
2 Methodology

When writing a thesis or performing any type of investigation, it is important to have a clear and well motivated list of methods declared. This is to make sure that all the gathered information and research have been obtained in a correct and academic way which should ultimately lead to giving the report validity.

2.1 Qualitative study

According to (Trost, 1993) a collection of information can either be qualitative or quantitative. An example of a quantitative collection of data is a questionnaire in which there are many subjects who respond and the answers are chosen from a list of suggestions. An interview is more of a qualitative type of research which is suitable for questions with more multifaceted answers. Qualitative research is best suited for this report as the question has more of a “how” character than “which”.

2.2 Data collection

Two types of qualitative case studies will be made; a primary data collection consisting of interviews and a secondary data collection consisting of market research.

2.2.1 Primary data – Interviews

A number of interviews will be performed to gather a broad perspective. The results from these will then be analyzed with the results from the secondary data collection.

There are different degrees of standardizations (Trost, 1993), or variations in the interviews. The interviews will be performed with three categories of actors; ISPs, the infrastructure company and the telecom regulator, PTS. As such, three, slightly different lists of questions will be created, each to best suit the interview subject. Further, a question in an interview can be structured or unstructured which determines the type of response which the interview subject is allowed to give. The interviews for all categories will be unstructured which means that the type of answer is undefined. The point of this is to receive an answer which is from the subject’s own point of view and that has not been influenced by the person performing the interview.

When discussing the different types of interviews, telephone interviews are normally structured (Trost, 1993). Due to the fact that they are performed over the telephone sometimes makes it difficult for the interview subject to elaborate. Although the interviews for this study will be performed via telephone, a speaker phone will be used in an isolated environment which will provide a clear communication channel for the interview subject and both authors of this report.

In order to get all information possible the interview subject will be given the option to be anonymous, both personally and company wise. Also, to establish an as truthful interpretation as possible, the interview subject will be sent back the interview transcript for review and clarification. It is also recommended only asking short and concise questions (Trost, 1993) in order to not confuse the subject and not receive only partial answers. Therefore, all questions that are built up of several, smaller questions have been separated into single, short questions.

The operators which will be interviewed are Tele2, Telia, and Com Hem. To get a more independent perspective, the Swedish Post and Telecom Agency will be interviewed in two sessions, with two different people. Finally, as Skanova is Sweden’s largest infrastructure owner and sole provider of copper network access, two interviews will be performed with this company.

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5 Post och Telestyrelsen
2.2.2 Secondary data – Market research

A case study is a method used to perform social science research, which allows the investigator to retain meaningful characteristics of real-life events such as international relations or maturation of industries. The method is a way of investigating an empirical topic by following a set of pre-specified procedures. One situation which is exceptionally appropriate for using case studies is when a “how” or “why” question is being asked about a set of contemporary events, over which the investigator has little or no control (Yin, 2003). This report aims to answer such questions. The formulation of questions in this report may not be “how” or “why” but rather “what” which still fits the profile. The subject is also completely out of the authors’ control.

As this report investigates a question about a contemporary situation, it is difficult to find academic literature which can give information and answers that are current and up to date. For this purpose, various reports and statistics purchased from analyst firms across the world have been used. These reports can generally be purchased online, in an electronic format or ordered as a physical copy. They are produced by international firms who supply companies in telecom and other industries, with vital information at a considerable cost and are therefore considered as reliable sources of information.

To better understand what defines a successful broadband market, a case study of two groups of countries were performed. First, a group of benchmark or “best practice” countries were formed and studied in order to give an indication of what helps a successful broadband market. Second, a group of struggling or not as successful (from a broadband penetration point of view) countries were examined in order to give an indication of what elements are missing and therefore hindering a broadband market from reaching a high penetration. The second group of countries were selected from the MENA region as there is a diversity of financial situations and many are applying for memberships in the World Trade Organization.

The benchmark countries chosen for this report are:
- Canada
- France
- Japan
- South Korea
- Sweden

The MENA countries chosen for this report are:
- Egypt
- Iran
- Jordan
- Qatar
- Saudi Arabia
- Turkey
- United Arab Emirates

2.3 Reliability

When researching the MENA region and the benchmark countries, it must be insured that the gathered results have reliability and validity. A big part of the case studies in this report will be statistics, and it is important that these are correct to make an accurate observation. However many times, it is difficult to define a statistic as correct as one statistic can mean several things. Therefore the sources for this case study were critically inspected so that there is no mistake of what is meant (Patel & Davidson, 2003). Another precaution is to, in every way possible, use statistics from the same source for all markets so that the measuring method is consistent.
Reliability is also an issue with interviews. Some questions are answered with objective facts and some questions are answered with opinions. Since this thesis will contain interviews with companies who are competitors with each other, it is important to be objective and impartial. Misunderstandings are also a reliability issue when performing interviews. It is important to always ask what the subject means when being the least bit hesitant (Jägerskogh, 2001). This is not just a way to understand the answer but many times a way to get more information than expected.

2.4 Presenting Interview Results

To establish an understanding of the Swedish broadband market, seven interviews were carried out with Swedish operators, the Swedish Post and Telecom Agency (PTS) and also with Skanova, which supplies access to the network. The results of the interviews are meant to give a more detailed and deeper insight into the Swedish broadband market, the relations between the operators, the PTS and Skanova. The interviews will not be listed in detail. Instead a summary of the most important results will be presented.

2.5 Analysis

For this thesis, four different case studies have been made. First and foremost, a very basic breakdown of broadband technology was performed, in order to understand how surrounding environments affect the possibilities. Second, a benchmark study was made so that exemplary practice could be observed. Third, a series of interviews with Sweden’s regulator, infrastructure incumbent and ISP’s were carried out in order to get a first hand perspective from as many points of views as possible of one of the benchmark markets. Lastly, to try to understand what can hinder and drive broadband development, a group of countries in development were researched. After all has been investigated, an analysis and comparison has to be made so that a thorough conclusion can be made.
3 Theoretical background

In this chapter the information that has been gathered will be presented. This comprises the technologies that are being used for broadband access, information about benchmark countries, information about Swedish operators and information about countries in the MENA region.

3.1 How does it work? What technologies are there?

Broadband is a common name for high speed Internet but is defined by the Swedish PTA as any Internet connection supporting downstream speeds of 2 Mbit/s or higher (Davidsson and Holmström, 2008, p. 21). With the technology available as of the writing of this report, wireline broadband internet can be supplied through three basic groups of ground technology.

There are two types of broadband equipment, passive and active. Passive broadband equipment includes infrastructure such as copper wiring, fiber optic cables and other equipment that is not replaced very often and runs itself without electricity. Normally, passive equipment is fully paid for by the company within a time frame of 20 to 50 years. Active equipment has a shorter life span and is often paid off within two or three years. It includes more technology dependent products such as routers, terminals and other equipment which needs electricity to run.

The three types of fixed line broadband technologies are xDSL, cable and FTTx (Corning, 2005, p. 2 ff) where xDSL utilizes the existing copper lines often used for fixed telephony. Cable Internet runs through an existing cable television network and FTTx runs via a fiber optic based network. Fiber optic networks require new fiber to be laid as there has been no previous use for fiber infrastructure prior to FTTx.

3.1.1 xDSL

The biggest advantage of xDSL is obvious; it does not require any new infrastructure where POTS lines are present. Even if broadband over cable networks do not require this either, housing with ground television cable drawn is much rarer. A problematic fact with xDSL is that the traffic speeds diminish with the distance between the customer and the DSLAM. The DSLAM is a networking device which connects a group of xDSL customers to the Internet backbone, in other words; it is the connection between the customers and the World Wide Web. Compared to classic modem dial-up technology, xDSL allows voice traffic over the phone while connected to the Internet. This is accomplished by using higher frequencies (25 kHz and above) for Internet traffic and lower frequencies (4 KHz and below) for telephone services, (Corning, 2005, p. 3).

ADSL

The “x” in xDSL is a prefix referring to different types of DSL technologies. ADSL is an asymmetrical DSL which means that the upload speed is different from the download speed, in most cases, slower. This is one of the earlier DSL technologies and also the most common. The latest, current ADSL technology (ADSL2+) delivers download speeds up to 26 Mbit/s (but only 1 Mbit/s upstream) (Corning, 2005, p. 4).

VDSL

VDSL stands for Very High Speed DSL and can with current technology (VDSL2) reach speeds of 100 Mbit/s both up- and downstream, simultaneously. This is accomplished by raising the frequency to 30 MHz (compared to the 24 kHz used for classic ADSL) (Aware, 2006, p. 3). Of course, when raising the traffic speed to 30 million signals per second, the customer must be much closer to the DSLAM. Speeds with VDSL2 drop after the distance becomes greater than 300 meters compared to 2 kilometers with ADSL2+ (Aware, 2006, p. 8).

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6 The Swedish Post and Telecom Agency
7 x Digital Subscriber Line where “X” refers different variations of the technology
8 Fiber To The x where “X” refers to different variations of the technology ie. FTTH (Fiber To The Home) or FTTB (Fiber To The Building)
9 Plain Old Telephony System
10 Digital Subscriber Line Access Multiplexer
LLUB/LLU
LLUB is an abbreviation for the term Local Loop Unbundling which is the process where an Other Licensed Operator (OLO) connects its network to the incumbent operator’s local loops or wires (Sonus Networks, 2005, p 5). In other words, the incumbent grants an OLO access to infrastructure in exchange for payment. This infrastructure is most often not built up from market powers but with funding from governments. The fact that an incumbent is able to provide LLUB to OLO’s gives it what is called Significant Market Power (SMP). This SMP should be regulated by an independent authority in order to achieve effective competition on the telecom market (Sonus Networks, 2005, p 5).

3.1.2 FTTx

Fiber optic Internet technology has the advantage of using light instead of electricity which is beneficial because of its ability to withstand interference and attenuation. This means that much higher speeds can be reached over much greater distances. Another benefit with fiber optic technology is that at the time of the writing of this report, it is cheaper to lay compared to standard copper lines. The term FTTx however, does not specify that fiber has to be used all the way between the operator and customer. In fact, any internet that has any part of its regular copper wiring replaced with fiber is considered FTTx and VDSL2 is an example of just that. As previously stated, VDSL2 at 100 Mbit/s speeds can only be supported for distances under 300 meters. Most often, the technology uses copper lines from a group of customers to a cabinet which then connects to the operator via fiber, because of the distance (Corning, 2005, p 5).

With FTTx there are two types of approaches. Point to Point (P2P) and Point to Multipoint (P2MP). In P2P the operator has a dedicated fiber running from the central office to the customer. This is often the case when dealing with corporate customers or apartment buildings where several end users can benefit. One major advantage of P2P is that there is always a dedicated path between the customer and operator which ensures security and simplifies customer service (Corning, 2005, p 6).

In P2MP however, one optical line is drawn out from the operator to an area and is then divided with a passive splitter to the different customers. The splitter is said to be passive because it does not require electricity or maintenance. One of the most obvious benefits of P2MP is that it requires less amounts of fiber and fewer connections at the operator’s central office. On the other hand P2MP requires splitters and more expensive active equipment. An example of a common situation is an operator who will use P2P for larger businesses (as there would be many computers connecting at the business building) and P2MP for housing areas where one fiber is divided with a splitter, to many different, individual houses (Corning, 2005, p 5).

3.1.3 VoIP and IPTV

IPTV and VoIP are two services that go hand in hand with broadband technology. IPTV is television broadcasted over internet infrastructure and VoIP is the same principle, but with telephony. The two services, bundled with a broadband internet service is referred to as Triple Play (Robins, 2005, p 5). These new technologies have introduced completely new rules for the broadband market and most of all, new competition. An internet service operator is no longer only a competitor with other ISP’s but now also with fixed line telephone companies and TV companies. At the same time cable television companies can introduce internet services via their cable TV network that often are completely independent from the telephone and fiber optic infrastructure and in that way pose a threat to xDSL and FTTx focused ISP’s.

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11 Companies often first established as regulated monopolies. In Sweden, this would be Televerket/TeliaSonera
12 Internet Protocol Television
13 Voice over Internet Protocol
3.1.4 Mobile Broadband

A recent trend in internet service is the introduction of mobile broadband. This is the high speed internet access provided through a cell phone service, most often, 3G (UMTS Forum, 2005, p 1). The service can be utilized either via a cell phone or a computer and can (theoretically) at the time of writing of this report reach download speeds of 14.4 Mbit/s. Unfortunately these speeds are only theoretical and are greatly affected by a number of factors. Among these are the number of users using the same radio station at a time and the distance between the user and the station. Furthermore, the range of the station decreases when the number of users increases (UMTS Forum, 2005, p 5).

3.2 Perceived successful markets 2008

As part of establishing an understanding of what defines a successful market, the authors of this report have decided to examine Sweden’s broadband situation as it is believed to be an example of just that. This is a natural starting point for the investigation since it’s “close to home” and it’s easier to establish contact with local ISPs and organizations. Other markets which are considered successful (by the authors) will also be examined to get a better understanding of the factors. These markets are primarily Korea, Canada and Japan which all have a very high broadband penetration and a special case is Japan which has an extremely high FTTx penetration. When data from these countries is combined, it will be applied to other markets.

In Sweden, a very common form of fiber is so called municipal networks (stadsnät). These contain a great deal of the infrastructure that is used and will be used for IT services and reach roughly three million households, as of the writing of this report. The unique thing about these municipal networks is that they all have different owners in contrast to the common situation with one infrastructure owner. This means that there is a competitive market instead of a monopoly, (Borbos, no date).

3.2.1 Swedish operators and their activities

Below the four largest operators in Sweden will be listed together with a brief description of each company and their offers. The Swedish Post and Telecom Agency will also be described as well as Skanova, the provider of access lines for operators. See TABLE 1 for a price comparison between the operators.

Tele2

Tele2 is Europe’s leading alternative telecom operator\textsuperscript{14}. It was founded in 1993 by Jan Stenbeck and is since 1996 noted on the Stockholm stock market. The company is currently providing mobile services in 13 countries, fixed telephone in 14 countries and broadband in 16 countries. In Sweden, Tele2 has been offering broadband since 1991\textsuperscript{15}. Today, they offer many different types of broadband for different prices:

- Broadband via telephone line (xDSL)
  - 0.25 – 24 Mbit/s, 99 – 299 SEK/month
- Broadband via tv-outlet (cable)
  - 0.25 – 24 Mbit/s, 99 – 299 SEK/month
- Broadband via municipal network
  - 1 – 100 Mbit/s, 69 – 249 SEK/month
- Broadband via LAN (FTTx)
  - 10 – 100 Mbit/s, 229 – 295 SEK/month

\textsuperscript{14} According to their own website

\textsuperscript{15} Tele2 merged with Comviq (active since 1981) in 1997 which explains the early entry in the broadband market.
Bredbandsbolaget (a part of Telenor)
Bredbandsbolaget is Sweden’s biggest alternative broadband supplier\(^{16}\). With over 460 000 connected households or 25 \% of the market share they are the second biggest broadband supplier. The company was founded in 1998 and currently employs 335 persons. Bredbandsbolaget today offers telephony, broadband and IPTV, Telenor offers mobile telephony. These are the current broadband offers:

- Broadband via telephone line (xDSL)
  - 1 – 24 Mbit/s, 199 – 349 SEK/month
- Broadband via LAN (FTTx)
  - 2 or 100 Mbit/s, 229 and 320 SEK/month resp.

Telia (now merged with Sonera to TeliaSonera)
Telia was formerly a government owned company but was privatized in 2000. Telia is the biggest broadband provider with 1 547 000 connected households and has 40 \% of the market share\(^ {17}\). The company also offers telephony, mobile telephony and IPTV. The current offers are:

- Broadband via telephone line (xDSL)
  - 0,25 – 24 Mbit/s, 199 – 329 SEK/month
- Broadband via LAN (FTTx)
  - 0,25 – 100 Mbit/s, price unknown
- Broadband via municipal network
  - 10 Mbit/s, price unknown

Com Hem
Com Hem is Sweden’s leading supplier of triple-play services (telephony, TV, broadband). About 40 \% of Sweden’s households have access to their services. The company was founded in 1983 and has ca 700 employees. Com Hem has been offering cable-TV since the beginning of the eighties and digital TV since 1997. Broadband services began in 1999 through cable. They now offer:

- Broadband via cable
  - 0,25 – 24 Mbit/s, 99 – 339 SEK/month (24/8 Mbit/s is also offered for 399 SEK/month)

### TABLE 1. Table of different speeds and prices from different providers\(^ {18}\).

<table>
<thead>
<tr>
<th>Company</th>
<th>Speed</th>
<th>Telephone line (xDSL)</th>
<th>LAN (FTTx)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0,25</td>
<td>0,5</td>
</tr>
<tr>
<td>Tele2</td>
<td>99</td>
<td>149</td>
<td>*</td>
</tr>
<tr>
<td>Bredbandsbolaget</td>
<td>*</td>
<td>*</td>
<td>199</td>
</tr>
<tr>
<td>Telia</td>
<td>199</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Com Hem</td>
<td>99</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

* N/A
** Price unknown

The Post and Telecom Agency
The Swedish Post and Telecom Agency (PTS) monitors the electronic communications and postal sectors. This includes telephony, the Internet and radio. The PTS was founded in 1994 and was called Telestyrelsen before that (founded 1992). The agency works with consumer and competition issues, efficient utilization of resources and secure communications (PTS website). The goal is to ensure that

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\(^{16}\) According o their own website

\(^{17}\) According o their own website

\(^{18}\) Information extracted from each provider’s homepage respectively (01-04-2008)
the market is competitive enough to one day be able to manage on its own without the need for independent regulation. Today, access to a phone line is a public service and in the future, the same will be true for broadband access (personal communication, PTS 2008-04-18).

Skanova
Skanova is a daughter company of TeliaSonera which is responsible for operating the Swedish Transport and access network for telecommunications in Sweden (Skanova website). Commercially, Skanova will place TeliaSonera on equal terms with other operators regarding all copper-related services. Some products that are not transferred from TeliaSonera to Skanova will be offered by TeliaSonera International Carrier. The separation began in the fall of 2007 and was officially in effect as of January 1\textsuperscript{st}, 2008.

3.2.2 Benchmark countries

This section will list a few countries which are deemed successful based on: internet penetration, broadband penetration, range of services and affordability. Sweden is a successful market but it is not the only successful market in the world. There are a few other countries which are believed to be examples of successful markets by the authors of this thesis. These markets are seen as successful because of a number of preliminary factors. These are to name a few: internet penetration\textsuperscript{19}, broadband penetration\textsuperscript{20}, price for broadband service, price for service relative to income et cetera. Four countries were hand-picked for a little closer inspection; these are, other than Sweden: Japan, South Korea, Canada and France. All of these countries have a high internet penetration (> 57.5%), broadband penetration (> 55.6%) (Mastrangelo, 2008), and the price for services is low as well as the price relative to Gross National Income per person (GNI). The purpose is to examine, by studying the situation in these countries, what conditions lie behind the favorable broadband climate.

Sweden

Although it is the smallest (in population) of the countries in the benchmark group, it compares good in the competition. Sweden has a broadband penetration of almost 59 % of households, and Internet penetration of 77 % (Mastrangelo, 2008). The VoIP penetration is not the best but it comes in at tenth place in the world (of available data) at 12.9 % of households with broadband. Although the urban population makes out 84 % of total population, Sweden is a country with a tough geography. The population density is quite low overall and the north of Sweden has especially low density, this makes it tough to provide everyone with broadband connections. However, a study made by Statistics Sweden shows that the number of people who do not feel the need for broadband is (5 % of men and 6 % of women in the ages 16-74) (SCB website, 2008) actually higher than the number of people who do not have access to any kind of broadband connection, which is 100 % of population and 99.9 % of work places, (Davidsson and Holmström, 2008). The Swedish government started to gradually terminate the connection monopoly in 1988. In 1992 the law of radio- and telecommunications was passed with the motive “Efficient competition is the means to reach the telepolitical goals.” The market was open for competition on equal terms. At this time though, Telia, the leading telecom operator, had more than 90 % of the market. Several other law changes for more efficient competition followed the coming years, but Telia remained the dominant operator on the broadband market, albeit not as dominant as before (Bergdahl, 2004, p 50).

Japan

Japan has the highest FTTH penetration in the world with 22 % of total households connected. It is one of the most successful broadband markets in the world. There are a few factors that contribute to this. The first one is overall broadband penetration which, although is not one of the absolute highest in the world is moderately high at 56 % of households (Mastrangelo, 2008). But this is not the reason for Japan

\textsuperscript{19} Percent of households which have internet access, broadband or other technology.
\textsuperscript{20} Percent of households which have broadband access.
being an especially interesting market; it is the high FTTH penetration, which at 22 % is the world’s highest, however it should be noted that that is not the highest FTTx\(^{21}\) penetration in the world which currently South Korea holds at 32 %. The internet penetration rate is at ca 69 % of population\(^{22}\) (Internetworldstats, 2008). Japan is also one of the world’s cheapest countries when it comes to broadband, this is measured both in absolute and relative price (videlicet compared to income). This leads to another factor which is used to measure probability of success which is GNI, Japan has a GNI of 38 410 $ (2006, World Bank, atlas method) which is a fairly high amount qualifying in slightly higher than Germany but slightly lower than Belgium for reference. The Japanese government is somewhat different from other governments, for example the US in the way investments are handled. The Japanese make long-term investments, knowing that the benefits will be reaped maybe many years later, while US companies must show results every quarter (Gross, 2007). In 2000 Japan created its Information Technology Strategy Council and its “Basic IT Law” which was followed by “e-Japan” in 2001 and subsequently “e-Japan strategy II” in 2003. These programs were basically a combination of subsidies, low or zero-interest loans and tax incentives for broadband providers. These were a means to achieve the goal of offering 30 million households fast broadband access by 2004. This was in turn followed by the next program, “ubiquitous-net Japan” or “U-Japan” in 2004 which had the goal that by 2010, every device would be connected to the network and able to be managed at any time, any place. In order to try to close the gap between rural and urban areas, “IT New Reform Strategy” was developed in 2006, with the goal to provide broadband to every household in 2010. Furthermore, the Japanese government introduced other economical benefits for operators (Atkinson, 2008).

South Korea

South Korea is really a remarkable country in many aspects. The country has grown to be the one with the highest broadband penetration in the world, and this happened over just four years since the first introduction of broadband services in 1998 (Lee, Oh and Shim, 2005). Other than having the highest broadband penetration in the world, Korea also has the highest proportion of FTTx, as stated above, which is remarkable for a country with not so great an economy compared to the other top five or top ten countries. Korea’s GNI is 17 690 $ (2006, World Bank, atlas method), compared to Japan’s 38 410 or Sweden’s 43 580, which is less than half the income of comparable countries. The broadband penetration is at 92 % of households (Mastrangelo, 2008), and FTTx is 32 % of total broadband penetration. The Korean government early realized the benefits of a well built infrastructure and the possibilities that it implies. In 1999 the “PC for Everyone” program was launched which would provide affordable PCs. Besides that, the government itself purchased 50 000 PCs to provide to low-income families with full support for broadband fee for five years (Kushida and OH, 2006). In 1999 the government also set up a program “Cyber Korea 21” (Lee, Oh and Shim, 2005), which would set the basic direction for a “knowledge-based society”; this would further increase the convergence to a larger and more developed IT sector. In 2004, the Ministry of Information and Communications created the IT839 strategy which would create a ubiquitous information infrastructure by 2010 (839 stands for eight services, three pillars and nine new growth engines) (Atkinson, 2008). Korea is a fairly small country with high population density (493 persons/km\(^{2}\)) (UN, 2004), compared to for example Sweden, which has a tough geography and a population density of only 20 persons/km\(^{2}\).

Canada

This is the most evolved broadband country in the Americas which is why it is one of the other successful markets in the study. With a broadband penetration of 68 % (Mastrangelo, 2008), and the closest competitor (US) at 55 % broadband penetration, Canada stands out. The relatively high penetration is quite remarkable considering that Canada has one of the lowest population densities in

\(^{21}\) FTTx includes all types of fiber connections (Fiber To The; Building, Node, Basement, Curb, Home etc.) while FTTH only refers to one specific type of connection (Fiber To The Home)

\(^{22}\) It should be noted that Internet penetration and broadband penetration are measured by different means, Internet penetration is measured per person and broadband per household which could result in the Internet penetration being lower since multiple persons normally live in one household.
the world at 3.2 persons/km², albeit the population is mostly concentrated in urban areas. The CRTC (Canadian Radio-television and Telecommunications Commission) is responsible for regulating the market resulting in Canada having some of the lowest telecom prices among OECD countries (2008, Pyramid Research). The CRTC have during previous years made sure that the monopoly was opened up and that all operators provide an affordable service of good quality for both urban and rural areas (2007, CRTC Telecommunications Monitoring Report). In 1993 the Canadian government initiated an incentive to increase “connectedness”. 1996 to 2006 $ 250 million per year was spent in order to “promote online access, adopting incentives for companies to create indigenous Internet content, expediting e-commerce, and promoting cross-agency e-government services” (Atkinson, 2008, p A1). In 2001 two programs were created to provide targeted grants for public-private partnerships in rural communities in order to create broadband infrastructure: the Broadband for Rural and Northern Development (BRAND) and National Satellite Initiative (NSI). Later, in 2006 the Ubiquitous Canadian Access Network (U-CAN) was created to provide grants to establish broadband access where commercial operators are not providing access (Ibid). An indicator of growth is also the expected increase of HDTV by a CAGR²³ of 60.5% and VoIP of 40.3% (Pyramid Research, 2008), between 2006 and 2012 which in turn will increase the demand for more widespread and faster broadband services. Canada is a wealthy nation with a GNI of 36 170 $ (2006, World Bank, atlas method).

France

With a broadband penetration of 62% (Mastrangelo, 2008), France is not especially remarkable in that aspect but it is the high VoIP and IPTV penetrations that are of interest. France is leading the way in this area and setting the standard for other countries. The VoIP penetration is at almost 45% of total households (not 45% of broadband households), which is remarkably high, with the closest competitors, Japan and The Netherlands at 33% and 32% respectively. The IPTV penetration is at 17.6% of total households which is not the highest penetration; however France has the most total IPTV subscriptions in the world. Hong Kong has the highest penetration at 42% even though the total subscriptions is circa ¼ of France’s (Mastrangelo, 2008). France’s telecom regulator, ARCEP (L’Autorité de Régulation des Communications Électroniques et des Postes) is responsible for ensuring a healthy market and has recently proposed measures for regulating the FTTH market in France. The French government has not been as active as those of South Korea or Japan, in 2000, the “e-Europe Plan 2005” was created but this stated that the private sector would lead the broadband development. However, in 2001, the government realized that the market forces alone could not perform this task. This was tackled by giving local authorities the task of broadband development. A government-owned bank, Caisse des Dépôts et Consignations was assigned to provide loans at lower rates for the broadband investments. The municipalities though had to ensure that fair, transparent and non-discriminatory access was given and that the municipalities could not act as operators. This was however slightly changed in 2003, stipulating that if no other operator was present, the municipalities could act as operators (Atkinson, 2008). One particular subject is the sharing of the physical fiber connections, the ARCEP states that if an operator installs fiber in one building it must provide access to the infrastructure to competitors, ensuring that no local monopolies on high-speed connections arise (ARCEP website, 2008).

3.3 Positive and negative effects of high broadband penetration

In this chapter the positive and negative effects of a high broadband penetration will be discussed. Special aspects of this will be: the economic effects, the societal effects and personal negative effects. One might naturally assume that high broadband penetration is something that is only positive, but that is not the whole truth. There are aspects of high broadband penetration which could cause problems in the society. A study made in South Korea, “Do we need broadband? Impacts of broadband in Korea” tells of this. South Korea is a good country for this kind of study thanks to the great rise of broadband

²³ CAGR, Compound Annual Growth Rate, denotes the average growth rate per year during a certain period. This can be exemplified by a growth from 100 to 200 over 4 years which would generate a CAGR of 18.92 % per year while the arithmetic value would be 100%.
connections in a short time. Korea had a broadband revolution and is now one of the leading countries in the world in number of broadband connections per user. In the study it is said that "Broadband is considered as a key to enhancing competitiveness of an economy and sustaining economic growth". Though vigorous implementations of economic reforms, Korea's IT sector grew from 8.6 % of GDP to 13 % in just three years. This was the beginning of strong economic growth which also led to a huge increase in broadband connections, from ca 2 000 000 subscribers in 2000 to ca 11 000 000 in 2003. The percentage of online stock trading transactions made and the amount of online banking users grew substantially during this same period.

A rise was also seen in online shopping, which increases competition and thus benefits the customers as well as stimulating the economic growth. The report also states an interesting fact; the investment in broadband equipment and installation itself generates many jobs and, in Korea, generated more money than invested and also increased the value-added generated. Online gaming was also given a big push due to more broadband connections resulting in three times more gaming companies and an annual increase of employees of 50 % over a four year period (Lee, Oh and Shim, 2005). Another positive effect, which is not a direct benefit from broadband, but can be associated to it is the use and growth of mobile broadband. As people get used to broadband with all its benefits it is much easier to take the leap to mobile broadband. Although mobile broadband is seen as a complement to fixed, its growth is, partially, attributed to the fixed.

Another study, which was executed in the USA, shows similar results. It is stated that the existence of broadband in any given region provided more rapid growth in employment, the number of businesses overall and businesses in IT sectors, than for comparable regions without broadband. A statistically significant rise in average wages was not found, but the effect of broadband availability provided higher property values (Lehr, Osorio and Sirbu, 2006)

There are many positive effects of broadband, some are more obvious than others but there are also negative effects to be considered. One aspect is the possible increase of addicts, both internet addicts and gaming addicts. The negative effects seem to be few and are hard to find. One study does state: “...aggregate data may fail to accurately reflect developmental impacts that are visited on well-defined subpopulations and may confound positive effects found in certain segments of target communities (e.g. businesses that adopt broadband communications services) with negative effects on other segments (e.g. competing businesses that fail to adopt them or adopters that fail to use them effectively)” 25. This is however a hypothesis and is not backed up by any data in the study.

3.4 Broadband in the Middle East/North Africa

The broadband situation in the MENA 26 is interesting. Although different countries have had different levels of success in raising broadband penetration levels, some have unusually low levels relative their GDP per capita (Figure 1) which raises questions about what other factors (besides money) can either hinder or promote high broadband penetration.

24 Gross Domestic Product
26 Middle East North Africa
Figure 1. Broadband penetration per person, divided by GDP per capita (higher is better). Source: TABLE 2

In a report (Parry, 2007) explains that the Middle Eastern telecom markets have experienced “intensive liberalization and deregulation”. She also talks about how most countries in the Middle East present a special scenario as they have opened up the mobile market to competition before the fixed resulting in lower prices. This in turn leads to customers going straight to mobile phones without ever having a fixed line to the residence, a fixed line that could have delivered high speed broadband. She continues to tell that even though the high increase in mobile users, broadband access is virtually exploding in the region. Clear examples of this are Telecom Egypt of Egypt which experienced a 238% increase in xDSL subscribers between 2005 and 2006 or Saudi Telecom of Saudi Arabia which increased its subscribers with 134% during the same time frame. Another interesting point, showing what early stages most of these countries are in, is the fact that very few operators have begun to offer triple play services. ISPs in more competitive and mature markets have been forced to offer these services as time passed in order to distinguish themselves and stay competitive (Netopia, 2005, p 1).

As a basis for the study of the MENA region a group of countries was selected. Each country distinguishes itself in some way, making it interesting for this study.

3.4.1 Iran

Iran has a population of almost 70 million people, with a median age of 26.4 years old compared to Sweden’s 41.3 or the UK’s 39.9 (CIA Factbook, 2008). This indicates that an already massive population has the potential to grow much bigger, incredibly fast.

The country’s fixed telecommunication is a monopoly held by government owned Telecommunication Company of Iran (TCI) and though there have been plans to sell up to 51% (even to foreign investors), this has yet to happen as of the writing of this report. There have been talks about releasing a second license for fixed telephony as well, besides privatizing TCI (BMI, 2008a, p 6) The mobile market however, has been privatized which has resulted in a vast rise of mobile phone subscribers. Between 2006 and 2007 the country’s mobile subscriber base almost doubled with a 98% increase from 14.3 million users to a little more than 28 million, BMI, 2008a, p 5).
In their report, *Iran Telecommunications Report Q2 2008*, Business Monitor International LTD have performed what they call a Business Environment Ranking in which Iran ranks among the two lowest of all the countries in the Middle East along with Turkey BMI, 2008a, p 8). There are a few different factors contributing to these low scores. Among these is the fact that Turkey and Iran have the lowest GDP per capita in the Middle East (though not in MENA). According to this report, the country also suffers from problems with regulatory independence, low average income as well as low levels of urbanization which prevents companies from easily rolling out new networks and services. The authors are also concerned with the level of government involvement not only with the monopoly of TCI but also the censorship of millions of web pages as well as a restriction of internet speed to a very low level (0.128 Mbit/s) designed to limit the users access to western influenced media (BMI, 2008a, p 26). Furthermore, the government does not allow VoIP (Parry, 2007, p 8). Even though Iran has several hundred ISP’s, all of them buy services from TCI through wholesale which, again, displays the monopoly held by this government owned company.

What on the other hand lifts Iran’s score is a relatively high level of fixed telephone lines (expected to exceed 35% by end of 2008) which obviously is of great importance to fixed broadband (BMI, 2008a, p 6,9). Lastly, the report points out that Iran’s short term economy should be stable as a result from high oil prices. However the longer perspective is much unsure because of pressures from US and UN as well as what the authors call “economic mismanagement” by the country’s president, Ahmadinejad.

### 3.4.2 Egypt

Egypt has one of the largest populations in Africa with an estimated 81.7 million people and an even younger median age than Iran (24.5) (CIA Factbook, 2008). Although its fixed market is currently a monopoly held by incumbent Telecom Egypt (Parry, 2007, p 8-9), a second license was originally scheduled to be auctioned out in September of 2008 by the country’s telecom regulator NTRA, but is at the writing of this report postponed until September 2009 due to unstable economic climate (NTRA website, 2008). The mobile market has been liberalized and received its third operator in May 2007, Etisalat Misr (BMI, 2008b, p 16). The country has during 2006 enjoyed a growth of 40% mobile phone users and an even higher increase during 2007 (73%) which leaves an estimated 31 million users at the end of that year. It is also important to note that even though Etisalat had a successful market entry during 2007, both of the two existing operators still increased their performance as well (BMI, 2008b, p 16).

Egypt’s government has a vision of increasing Internet and broadband in Egypt in order to increase efficiency in government and business as well as drive up standards in education and healthcare (BMI, 2008b, p 21). NTRA has identified low PC penetration and cost of broadband as the biggest factors hindering this and has initiated programs to handle the issues. These include selling out a second fixed license and starting the “Egypt PC 2010”. The latter involves business cooperation with computer companies such as Microsoft, Intel, AMD and Via technologies which reportedly has led to as much as 50% discounts. The second license is meant to introduce competition to the current incumbent, Telecom Egypt. The report discusses however, that there is a risk that since the holder of the second license will be new to the market it will only focus on the larger, urban areas with higher density infrastructure in the beginning. This would allow the incumbent to create a controlled monopoly over the rural, low-income areas. A second way the NTRA has tried to lower the cost of Internet is to make price regulations, lowering the cost of a monthly broadband subscription with 36% and creating a “free internet”-initiative for dial-up Internet services. This meaning that the customer only pays the cost of a local call, and no monthly fee.

Even though Egypt’s internet penetration (per person) is only 11%, the country has witnessed a healthy growth of Internet users with a 43.7% increase in users from 2006 to 2007 and the progress is expected to continue over the next coming years (BMI, 2008b, p 22).
### 3.4.3 United Arab Emirates

The UAE has a rather small population (roughly 4.62 million) (CIA Factbook, 2008), compared to the other MENA countries examined in this report. It is still however, an interesting market for many reasons. For one, its mobile penetration is at an impressive 173% which is the highest for any country in the Middle East. It should however be noted that the source suspects that this number in reality could be somewhat lower due to unused pre-paid cards in circulation (BMI, 2008c, p 11-12). It should also be taken into consideration that the UAE has so called economic free zones from where companies can operate in a tax free manner. This has caused a large number of businesses, national and foreign to locate in such areas, Dubai being one example (BMI, 2008c, p 14). A large part of the population is therefore built upon not only ex-pats but also foreign, lower class working force. The latter being used to build up massive new establishments such as internet cities etc.

The UAE telecom market has up until recently been a monopoly on both the fixed and mobile side, which was held by incumbent Etisalat. This however changed during 2007 when second operator, Du, was introduced. Since then, Etisalat has been motivated to expand its business and expand in surrounding areas as well as reducing prices (both for mobile and broadband services) in UAE.

Even though the former monopoly officially has ended, there are still problems with the present situation. According to Business Monitor International, the UAE regulatory agency (TRA) may not be entirely independent which presents some problems as the incumbent Etisalat is 60% government owned (BMI, 2008b, p 9), (Parry, 2007, p 8). What’s more, the only competitor Du, is also partly government owned (50%) and has been instructed not to compete with Etisalat on a price basis (Parry, 2007, p 7). Another concern is the ban on VoIP. Skype services are forbidden but both Du and Etisalat seem to be close to offering VoIP services themselves. One final note about Du is that its business is restricted to the economic free zones in UAE (Parry, 2007, p 8).

The growth of Internet in UAE from 2005 to 2006 was 9.9% and another 9% in the next year. It also appears that the second operator, Du, mainly focuses on UAE’s economic free zones, creating a scenario much like the one feared in handing out a second license in Egypt (BMI, 2008c, p 14). Furthermore, BMI foresees a continuing steady growth over the next five years but fears that it might be slowed down due to improper regulation and a strong censorship. Lastly, the report (BMI, 2008c) makes a note of UAE’s high level of young citizens and ex-pats living in urban areas.

### 3.4.4 Qatar

Qatar holds one of the smallest populations in the Middle East (928,635), (CIA Factbook, 2008) but what’s more, it has a staggering low number of households (87,000) with an average of over 10 persons per house. This ultimately means that Qatar does not hold as big of a potential as for example, Egypt with its 15.88 million households (Mastrangelo, 2008). However, this market is still very interesting to look at as it has the highest GDP per capita in the world (International Monetary Fund, 2008) while it is surrounded by countries with much weaker economies. In addition to this, its population is expected to grow quite fast over the next five years (BMI, 2008c, p 7). As of 2007, both the fixed and mobile side were monopolies, run by Qtel although analyst firm, Ovum, states that this should be ended shortly as new licenses are to be handed out (Parry, 2007, p 8). Although VoIP has been banned, trials for triple play services had begun with quad play (addition of mobile service) expected to follow (Parry, 2007, p 15). Qtel has also showed ambition by acquiring the majority (51%) of Kuwait’s second mobile operator as well as operators in both Pakistan and Saudi Arabia (Parry, 2007, p 18). One last tell tale sign of its fantastic economy is Qatar’s second place in BMI’s business ranking among the Middle East nations indicating good potential on ROI\(^\text{27}\).

\(^{27}\) Return On Investment
3.4.5 Jordan

Situated in between Israel, Iraq, Syria and UAE, Jordan is a fairly small country with ca. 6.2 million inhabitants (CIA Factbook, 2008). Jordan has a young population with a median age of 23.9 and the population is expected to grow substantially over the coming five years (BMI, 2008d, p 9). Even though Jordan has a young population, which also is amenable towards new technologies, the low GNI per capita (2 660 $, 2006, World Bank, atlas method) and low purchasing power keeps new technologies from flourishing (BMI, 2008d, p 9). One very positive aspect of Jordan is that both the fixed and the mobile telephony are privatized and that VoIP is legal (Parry, 2007, p 8), which is not the case in many Middle Eastern countries. Having one of the lowest mobile penetrations in the region, Jordan is believed to have room for growth in this area, however, it should be noted that the real mobile penetration could be even lower than stated since it is believed that many of the prepaid subscribers are, in fact, inactive.

Despite that the fixed line sector is liberalized, the incumbent Jordan Telecom, in which France Telecom holds over 50 % of the stakes, is the dominant player. Jordan Telecom has not made big investments in other broadband technologies than DSL and the price for access is high. The Ministry of Information and Communications Technology is responsible for developing and formulating policies, while the Telecommunications Regulatory Commission is responsible for ensuring that these policies are being upheld. The economic situation is fairly stable, and will probably be stable during the coming years. Possible political threats are the rising fuel prices which can cause unrest with the population and the growing discontent of the largely poor population. King Abdullah II has had plans for reform but these have not been implemented to the extent that was promised which also causes unrest with the people.

Internet and especially broadband penetrations are low. This is primarily due to low pc-penetration, relatively high prices and lack of alternative broadband access technologies. The future is looking brighter though and higher penetration rates are expected. This will be enabled by Jordan Telecoms decision to drop wholesale rates on IP protocol by 25 % in late 2007, increased competition and the expansion of WiMAX. Even after these measures are taken though, BMI predicts that broadband penetration will rise to 6.6 % by the end of 2012, which is not a high number in international terms (BMI, 2008d, p 15-16).

3.4.6 Saudi Arabia

Saudi Arabia is a fairly large country with more than 28 million inhabitants, of which 5.6 million are non-nationals. The median age is low at 21.5 years which indicates that the country has potential for growth (CIA Factbook, 2008). On the mobile side, progress is being made; a third operator offers the potential for a more competitive mobile market and with it growth. There are also licenses for three new fixed line operators which should encourage growth in the fixed sector; however, high unemployment amongst young people, a small ADSL network today, the fact that VoIP is illegal and mobile growth, which could slow down the fixed line growth, are all threats against a large broadband market (BMI, 2008e, p 6). On the other hand, the GNI of Saudi Arabia is relatively high, an independent regulator is established since 2001 (Pyramid Research, 2008, p 7) and the Saudi Telecommunications Company (STC) is in progress of being privatized, although the government still owns 70 % of the company.

Internet and especially broadband penetration has been, and is still low. As of September 2007 International Telecommunication Union (ITU) reported a penetration of ca. 5.9 % of households. Almost 90 % of connections were ADSL, provided by STC. However, there is a demand for broadband; the problem is that over 50 % of applications had to be turned down as the applicants were more than 5 km away from the nearest exchange (BMI, 2008e, p 20). While this can be blamed on STC for not providing enough exchanges for the people, the Communications and Information Technology Commission (CITC) of Saudi Arabia states that the low population density is a problem which makes the expansion of exchanges difficult. Despite these facts, BMI believes that widespread deployment of WiMAX by STC (which was contracted to Chinese telecom giant Huawei) will help cover the areas which are hard to get to and also bring down service prices, making them more affordable.
Another aspect that should be considered as a potential threat is the filtering that the Saudi government is performing on internet traffic. On the CITC homepage this is explained as a mean to protect the users from seeing harmful content such as: “pornographic, lude, illegal, or otherwise objectionable content” (Saudi Arabian government website, 2008). But a study from Harvard shows that some of the blocked pages are, amongst others, Amnesty’s Saudi Arabia homepage (Harvard website, 2008).

3.4.7 Turkey

Turkey is the largest country in the Middle East, with a population of almost 72 million people, (CIA Factbook, 2008) and although the population is young it is believed to have the lowest population growth in the region over the coming five years. The expected slow growth in population is not the only problem with Turkey; a large portion of the population is of low income and is scattered across the country, resulting in one of the lowest urbanization levels in the region. This is a challenge for operators who wish to quickly deploy new networks. One positive aspect is that the mobile telephony market is not saturated yet so there is room for growth in that area, and although the competition is good, it is believed that mobile number portability would increase it (BMI, 2008f, p 9). Another positive aspect is that Turkey is a candidate country for EU, and could enter the EU in a few years, potentially increasing the economic growth (EU website, 2008). Turkey has an independent regulator (TRA), which was founded in 2000 and managed to end Türk Telecom’s monopoly on the provision of national and international voice telephone services at the end of 2003. Even if Türk Telecom has single-handedly driven the broadband development (Coham, 2007), few alternative operators have arisen. The reason being Türk Telecom’s reluctance in signing interconnection agreements, meanwhile the TRA has not been effective in new legislations which could help the competing operators (BMI, 2008f, p 9).

According to a Business Monitor International (BMI, 2008f) report, the Justice and Development Party (AKP) government has plans for economic and legislative reforms; this is believed to be a contributing factor to making 2008 a year of economic growth and prosperity. The latest measurement of fixed telephone lines per 100 inhabitants is from 2006 and was then 25.5, however, it is estimated by BMI that this number will decrease to as low as 20.9 in 2012. This is due to the substitution effect of mobile telephony, which rose by almost 23 % 2005-2006 to 70.9 % penetration and is expected to exceed 100 % penetration by 2010. Even though Türk Telecom experienced strong growth in the broadband market, it was not enough to maintain its fixed-line subscriber base.

On the upside, the number of Internet users in Turkey is rising. Internet usage has earlier been constrained by low PC penetration, but is now expected to grow much more as broadband services are becoming more affordable. An advantage for Türk Telecom is that it does not solely rely on fixed lines for broadband access, but also offers WLAN and VSAT connections for its customers. In August 2004 Türk Telecom cut its ADSL prices by over 80 % (Burnham, 2006, p 7) and again on April 1 2007 (BMI, 2008f, p 16), this was to gain a larger market share on broadband, making it more difficult for competitors. The TRA would like to enable other operators to co-locate on Türk Telecos network and also to be able to buy ADSL services from said company, since it owns a majority of the network (BMI, 2008f).
3.4.8 Statistics

In order to make objective assessments of each country, the most basic and vital statistics were gathered from various sources. It should be noted that the same statistic could sometimes be found from different sources with minor variations. Because of the difficulty in determining which statistic was the most reliable, one source was chosen and used consistently in order to achieve as uniform and as relatively correct results as possible.

**TABLE 2. Vital statistics for selected countries.**

<table>
<thead>
<tr>
<th></th>
<th>Egypt</th>
<th>Iran</th>
<th>Jordan</th>
<th>Qatar</th>
<th>Saudi Arabia</th>
<th>Turkey</th>
<th>UAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Internet penetration (PP)</td>
<td>11.2 %</td>
<td>17.7 %</td>
<td>14.4 %</td>
<td>32 %</td>
<td>25 %</td>
<td>19.4 %</td>
</tr>
<tr>
<td>2</td>
<td>Exp. Internet pen 2012 (PP)</td>
<td>25 %</td>
<td>52.7 %</td>
<td>18.1 %</td>
<td>43.9 %</td>
<td>35.8 %</td>
<td>54.1 %</td>
</tr>
<tr>
<td>3</td>
<td>Broadband penetration (PP)</td>
<td>0.6 %</td>
<td>1.2 %</td>
<td>2.1 %</td>
<td>8.2 %</td>
<td>2.6 %</td>
<td>7.8 %</td>
</tr>
<tr>
<td>4</td>
<td>Expected BB pen 2012 (PP)</td>
<td>7 %</td>
<td>2.4 %</td>
<td>6.6 %</td>
<td>N/A</td>
<td>27.4 %</td>
<td>12.9 %</td>
</tr>
<tr>
<td>5</td>
<td>Teledensity</td>
<td>14.5 %</td>
<td>34.6 %</td>
<td>10 %</td>
<td>28.8 %</td>
<td>16.9 %</td>
<td>24.4 %</td>
</tr>
<tr>
<td>6</td>
<td>Mobile penetration (PP)</td>
<td>40 %</td>
<td>40.8 %</td>
<td>91.7 %</td>
<td>132 %</td>
<td>106 %</td>
<td>83 %</td>
</tr>
<tr>
<td>7</td>
<td>PC penetration (PP)</td>
<td>3.8 %</td>
<td>10.9 %</td>
<td>5.6 %</td>
<td>N/A</td>
<td>35.4 %</td>
<td>5.2 %</td>
</tr>
<tr>
<td>8</td>
<td>Literacy (PP)</td>
<td>71.4 %</td>
<td>77 %</td>
<td>89.9 %</td>
<td>89 %</td>
<td>78.8 %</td>
<td>87.4 %</td>
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<td>9</td>
<td>TV penetration (PHH)</td>
<td>89 %</td>
<td>77 %</td>
<td>96 %</td>
<td>N/A</td>
<td>99 %</td>
<td>92 %</td>
</tr>
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<td>10</td>
<td>Cost of 0.128 Mbit/s € (or lowest)</td>
<td>5.6</td>
<td>21</td>
<td>9.4</td>
<td>36.5</td>
<td>3.4</td>
<td>16.3</td>
</tr>
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<td>11</td>
<td>GDP per capita, US $</td>
<td>5500</td>
<td>10600</td>
<td>4900</td>
<td>80900</td>
<td>23200</td>
<td>12900</td>
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<td>12</td>
<td>VoIP</td>
<td>Illegal, widely used</td>
<td>Legal</td>
<td>Legal</td>
<td>Illegal, widely used</td>
<td>Legal</td>
<td>Illegal</td>
</tr>
<tr>
<td>13</td>
<td>Level of political censorship</td>
<td>None</td>
<td>Pervasive</td>
<td>Selective</td>
<td>-</td>
<td>Substantial</td>
<td>-</td>
</tr>
</tbody>
</table>

1. Internet penetration. This number displays what percentage of the population are internet users as of 2007. (BMI, 2008abcdef)
2. Same statistic, only an estimate for 2012. (BMI, 2008abcdef)
3. Broadband penetration. This number displays how many broadband subscriptions there are per 100 inhabitants. It should be noted that this statistic can be misleading as there naturally would not be more than one subscription per household and different countries have different average numbers of people living in each household. For instance, Qatar has an average of almost 10 people living in each household while the corresponding number for Egypt is less than five. Therefore, if each country had the same figure in this statistic, Qatar would really be the country which had the highest level of broadband users and highest percentage of households with broadband. (BMI, 2008abcdef)
4. Same statistic, only an estimate for 2012. (BMI, 2008abcdef)
5. Teledensity. This number show how many fixed lines are installed per 100 persons. One must take into account, as with other statistics, that this does not just include households, but also businesses. (BMI, 2008f, p 51), (BMI, 2008a, p 5)
6. Number of mobile subscriptions per 100 persons. (BMI, 2008f, p 53)
7. Number of personal computers per 100 persons. (World Bank website, 2008)
8. Percentage of population above the age of 15 that can read and write. (CIA Factbook, 2008)
10. 
   a. Egypt (LinkDSL website, 2008)
   b. Iran (Pars Online website, 2008)
   c. Jordan (Orange website, 2008)
   d. Qatar (Qtel website, 2008)
   e. Saudi Arabia (Saudi Net website, 2008)
   f. Turkey (TTNET website, 2008)
   g. UAE (Du website, 2008)
11. Gross Domestic Product per person in the country. (CIA Factbook, 2008)
12. Whether or not Voice over IP is allowed. (Parry, 2007), (Al Bawaba website, 2008)
13. Level of filtering each country’s government performs. None, Selective, Substantial or Pervasive. (OpenNet Initiative website, 2008)
4 Interview Results

Interview results from seven interviews with Swedish ISPs, telecom regulator and infrastructure company are presented in this chapter. Rather than showing each interview result in detail, the most important sections have been lifted forth. For a detailed view of the interview questionnaires, see Appendix 1, 2 and 3.

4.1 Telia

Telia is Sweden’s telecom incumbent, the authors of this report spoke to a person in charge of private and corporate business development for Telia broadband. The main objective of this position is to increase sales of broadband and broadband services.

Telia’s USP\(^{28}\) is secure broadband. This means a number of things. First of all to portray a safe and secure image, this is enforced with high security software. In addition to this, the service is enhanced with anti-spam software which is meant to contribute to a smoother web experience. The company also tries to differentiate itself with the help of IPTV.

When asked about what has contributed to the success of Telia, the company replied that security and comfort has been a big factor. Different competitors have had different approaches. Telenor (then called Bredbandsbolaget), were first with setting aggressive prices. They also attracted the more technology informed segment of the market as they pioneered with fiber. While many have criticized the performance of xDSL (especially compared to fiber), Telia points out that they have managed to build up a very large customer base with this technology. Telia further feels that Com Hem approached the market with early offers of bundled technology. In short, when a customer wants broadband, Telia has become the natural choice for many as they appeal to the general masses. Even though Telia is a technologically competent and advanced company, they profile themselves as simple and secure as it is difficult to both be portrayed as secure and cutting edge at the same time.

When speaking of competition Telia claims that no there is no single company that poses an extraordinary threat but that a number of customers are moving from fixed to mobile broadband. Beyond this, one problem is that Bredbandsbolaget has been early with acquiring customers from other ISP’s. Telia has begun a similar strategy but has much to retake in this area. In general, it is no longer a question of recruiting as many new customers as possible but rather to acquire from other ISP’s and keeping your own.

The interviewee’s opinion of Sweden’s broadband market was a positive one. However, those households that still did not have broadband access will not receive it unless the individual customer is willing to pay the higher fee personally or government funding was added. Finally, it was concluded that Sweden has an extraordinary high percentage of homes reached by fiber although there is an uncertainty if that many Swedish people actually value the higher speeds.

Telia uses two different types of infrastructure; copper and fiber. The copper comes from Skanova and the fiber comes from either municipal networks or Skanova. The latter of which it counts as its own. When doing fiber work in an office or apartment building, Telia most often subsidizes the cost and in return receives exclusivity for the infrastructure for a certain number of years. This is also the way Com Hem works.

One service which is receiving much priority is IPTV, not only in general but also in HD and Full HD. Also, related services such as Video On Demand are on the way up. Other services include a so called “intelligent network” which is built up of a certain type of router which recognizes what type of devices are connected to them and then distribute bandwidth accordingly. VoIP is another issue. The only thing going for VoIP as of the time of the interview, is that it is cheaper than POTS services. A drawback is that

\(^{28}\) Unique Selling Point
there are problems with functionality and quality of service, problems that do not exist with POTS. However, since VoIP indeed does pass through IP, the possibilities are endless.

When it comes to competitors, Com Hem, Telenor (Bredbandsbolaget), Tele2 and Glocalnet are the biggest threats. Tele2 and Glocalnet compete on a price basis whereas Com Hem has a huge customer base thanks to their exclusive infrastructure.

The biggest factor, hindering expansion for Telia is the PTS and the demands which Telia constantly must meet. However, the interviewee points out that the regulatory demands are of course necessary, since Telia is coming from a position of domination. On the other hand, the subject feels that Com Hem is in a similar situation and yet, has no regulatory directives to follow which feels “unfair”. It was also pointed out that even though the copper infrastructure was financed by the government when Telia was government owned, Telia was still a profitable company of which the government reaped profits. The subject also claimed, as the case was with many other ISP’s, that no dramatic difference has been noticed since Skanova voluntarily separated in January 2008.

Finally the subject feels that mobile broadband is a big part of the future, even if it will not replace fixed broadband. Also, the future holds a greater number of new services.

4.2 Tele2

The respondent at Tele2 is responsible for the commercial aspect of Tele2’s broadband services. When asked about its USP\textsuperscript{29} the subject replied that Tele2 acts as a follower and perceived price leader. It lets other companies educate the market and follows with what aspects it perceives as potentially successful. Its target group is any residential housing in Sweden although focus lies within the most urbanized areas.

Tele2 supplies its products by three different means. For one, it sells xDSL through a service called IP stream which is purchased from wholesale seller, Skanova. With this method, Skanova provides the entire service with the exception of billing the customer and providing it with a modem. This is the most expensive way for Tele2 to provide customers with xDSL but also the only way to reach customers living near stations which do not have room for more DSLAM’s.

The second method is something called copper access which requires a little more involvement than IP-stream. Here the operator provides its own DSLAM in the exchange and mainly rents the copper wiring. This method results in less direct costs but requires more CAPEX\textsuperscript{30} and maintenance costs. The third, and final method, is LAN and cable internet. Tele2 provides its own LAN networks (in buildings and residential areas) with this method which leads to the lowest direct costs but obviously higher maintenance costs. The long distance transportation goes through fiber networks which Tele2 rents from companies competing on an open market. It is through these networks that Tele2 has most success.

Tele2’s absolute biggest competitor is incumbent Telia Sonera which Tele2 feels has managed to “hammer” in a sense of security into their customers. They also feel that Telia has an advantage because of their long experience and former ownership of Sweden’s copper infrastructure. This has led to them being able to deliver services to customers faster than other operators, as well as supplying them with better customer service. The latter part being a result of over 100 years experience with the copper network compared to other operator’s all but nonexistent experience.

Furthermore, Tele2 does not feel that Telia’s voluntary separation of Skanova has made any noticeable difference. The prices remain the same and Telia still has a knowledge and experience advantage although, the latter is obviously difficult to be made undone. Another problem with the Telia-Skanova situation was when Telia expanded their fiber networks and Skanova supplied this service. Once Telia

\textsuperscript{29}Unique Selling Point
\textsuperscript{30}Capital Expenditures
had completed this expansion however, Skanova stopped supplying this, to all customers. Skanova states, in another interview, that the reason for this was that the service was considered (by other buyers) too expensive.

Another strong competitor is Com Hem, because of its dominance of the cable broadband market. Tele2 states that within the urbanized areas, all ISP’s are competitors while in the more rural areas, Telia is the only real actor. The reason for this is apparently that Telia was fast and had resources to fill the telestations in rural areas with their own DSLAM’s. This leaves Tele2 with no other option than using IP-stream (for fixed broadband) to reach these customers which Tele2 must pay more to Skanova for, than Telia is selling xDSL to the end user. This obviously makes it very difficult to compete on these markets.

A cooperation to expand exchanges that are full (and make room for more DSLAM’s) between different ISP’s and Skanova exists. This work has however been progressing very slowly, something that not only Tele2, but also Skanova has acknowledged. Tele2 pointed out that it is not surprising that Skanova, which is in the same consortium as Telia, is not in a hurry to invite competitors.

In areas where infrastructure is available from companies other than Skanova, Telia has only about a 30% market share whereas this share (according to Tele2) dramatically increases in areas where Skanova is the sole provider.

When looking at the future and what drives expansion Tele2 believes that services are of great importance. The company states that because of lower costs, VoIP customers are preferred over traditional POTS customers, especially in the long run. VoIP customers do contribute to larger customer service costs but this is believed to be a result of VoIP being a new technology that customers are not yet entirely familiar with. IPTV is also a driving force, mainly because many homeowner associations have it as a requirement when implementing LAN in apartment housings. In other words, in order to be allowed to build LAN, the company must also provide IPTV. Where cable TV is present, it is very hard to offer IPTV since the cable network itself is designed to deliver a TV service. In areas with LAN and FTTx however, IPTV is an efficient product to offer. Via xDSL, at the time of the interview, Telia was literally giving away IPTV (if the customer had Telia xDSL and telephony) which made it impossible to compete.

When asked about its biggest limitation factor for expansion, Tele2 mentioned Telia and their position of monopoly. Areas where Telia (or their consortium) own and control the copper infrastructure and do not (or are not forced to) let Tele2 in (in a competitive way) are extremely problematic. Another problem, besides cost, is the time it takes for Skanova to activate services, ordered by Tele2. Because of Telias former involvement with Skanova, their delivery time is much faster. Although Tele2 have not experienced any difference since the breakout of Skanova, they still feel as if they have a healthy dialogue with the company.

Lastly, when asked about the future of broadband, the subject was convinced that services hold a very important role. Although wireless broadband is becoming faster and more available, he believes there will always be a need for fix broadband. IPTV will be a big driving force too, as well as VOD\textsuperscript{31}.

4.3 The Post and Telecom Agency part 1

The first interviewee will be presented in this section and the second in the next. The first is responsible for competition issues; the person’s job is to analyze the markets, see if there are any problems with competition and to help solve potential problems. In general, the PTS feels that Sweden has slowed down in its broadband development. During the beginning of 2000, large investments were made in infrastructure, this has now diminished. “Sweden is living off of the initiatives made some years ago” the interviewee says. The Swedish government has had an active role and made early initiatives on subsidies for the expansion of broadband. In a report from PTS “Förslag till bredbandsstrategi” (translated: Video On Demand. Renting movies via the internet.)
Suggestion for broadband strategy) it is stated that the earlier subsidies from the government were not enough to make sure that everyone would be able to have access to broadband.

To be able to get high internet coverage, two factors are of importance; the end consumers’ demand and willingness to pay, and basic conditions for infrastructure investments (permit to dig trenches etc). The government must set the long-term goals and the counties must offer access for the expansion says the interviewee. On the other hand, the PTS believes that the key to Sweden’s high penetration was, in part the “Home-PC” project, which has had great impact on broadband penetration. To enable more people to gain access to broadband, the PTS believes that two aspects should be considered; one of them is a functioning infrastructure and the other is that the government should take initiatives for using the infrastructure. In Japan and South Korea there are initiatives to use electronic communications in education, healthcare etc and use the counties as customers to drive the demand for broadband. In a normal Swedish county, the biggest consumer of communication services is the county itself.

There is a problem of trying to enable everyone to have broadband, for example those who do not have economic prerequisites for pc and broadband. This is a worldwide problem; other countries in Europe have the challenge of a poor infrastructure, the PTS says. When asked what requirements there are for competition which will benefit the end-consumers, the PTS replies: today there is no regulation on end-consumer level, the focus now is on enabling other operators to gain access and be able to sell their products to the end-consumers. To be able to facilitate competition, the authorities must intervene when competition problems occur. In Sweden’s case this means that TeliaSonera must enable other operators to connect through their lines.

Today, the PTS’ tools are not powerful enough to resolve the “TeliaSonera issue”, which is that Skanova is not supplying the products to other operators that they should. There are clear issues with ordering, trouble reporting etc. There were discussions during 2007 on the issue of “equal treatment” which is, in theory; a way to grant all operators the same conditions when buying products from Skanova, although no consensus was reached. The conclusion is that there needs to be involvement from the state and authorities in order to establish a competitive market, today it cannot manage on its own. When asked how the “TeliaSonera situation” could be avoided, the PTS answers that there is a political will to have competition in that area. The government strives to get to the point where there is parallel establishment of infrastructure so that different technologies can meet customer needs in parallel. Furthermore the PTS states that it is not obvious that the most socioeconomically efficient way is to have just one infrastructure reseller and share the infrastructure between the operators, which almost is the case in Sweden.

Finally the PTS thinks that services are driving the competition. The need for higher bandwidth has risen exponentially, HDTV will probably drive the need now and one might be fooled to think that demand will decrease after that but the PTS thinks this is a mistake, it has been done earlier and it is wrong to think so. The PTS also believes that the demand for fiber-infrastructure will increase strongly and that access to wireless internet connections will increase alongside.

4.4 The Post and Telecom Agency part 2

The second respondent does not work at PTS any more but did so for four years until the recent job change. This person was in charge of competition matters in the telephone market. The electronic communications sector is characterized by the fact that there is not enough competition. Special tools are required in order to induce competition. Telia’s fixed telephone network is a bottleneck, the PTS says. If competition is to be controlled, legislation must be made which gives PTS access to control; PTS must gain access to the bottleneck resources.

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32 A program enabling employers to let out computers to their employees tax-free.
33 Today, access to these services is granted by Skanova, TeliaSonera’s daughter-company.
When asked which role the Swedish government had during the expansion of the broadband network, PTS replied: the copper network has been built by the government. The government broadband support is meant to cover all the “white spots” where there are no operators active. The counties were given funds and this led to the creation of the municipal networks. In some cases though, the municipal networks were established where there already existed private operators and started to compete with these. This is an unhappy situation, to compete with private operators with government funds, PTS says. The municipal networks are just meant to act as an access supplier, they are not supposed to offer services and it is the county administration that is responsible for monitoring this. The PTS is concerned about this fact and it is also in conflict with the county law – the counties are supposed to supply things that are of general interest.

When asked which factors he believes determine if a country gets high internet coverage the reply is: there will always exist areas where it will not be profitable for a company to deploy. It is necessary to make continuous efforts where there are no possibilities of commercial deployment. Another thing that the PTS is interested in is joint ventures. This is an opportunity for, for example electrical companies and operators to simultaneously deploy electricity and fiber which would save enormous amounts of money. This is a resource which is not being used today and is something that the PTS hopes will start being used. When it comes to penetration though, the PTS believes that the price is the key issue. In order to get price competition, it is required that other operators can access Telia’s network at attractive prices, which is not the case today. It is imperative that there is access to the fixed network. Today, there is no perfect competition, Telia is vertically integrated and the PTS is not satisfied with the voluntary separation of Telia Access (Skanova).

Furthermore, in order for an operator to offer services, the operator must make a connection from its own network to the exchanges and a fiber connection is needed for this. Telia supplied this earlier but are not doing so anymore, no new fiber is deployed upon other operators’ orders. For an operator to dig its own trenches and deploy fiber is financially impossible. In this way, Telia has practically the right to stop anyone from gaining access to exchanges and fiber, PTS says. There are a great deal of exchanges which are full according to Telia because their own equipment is taking all the space, now they want to have joint investments in order to build more and larger exchanges but this is a process which is slow and has broken down. Telia has taken all the end consumers which is a big problem.

When asked how to increase the initiative for more people to have access to broadband, PTS replies: what PTS is trying to do is to establish a functioning regulation where Telia is forced to grant functioning access. Propositions have been made to assign more funds for broadband expansion. Frequencies have been set aside which have made it possible to use the old NMT network to provide wireless broadband in rural areas. The 800 MHz band will grant access to larger coverage for small amounts of money and high speeds. For this to work though Ericsson and Nokia must create functioning systems for these frequencies, this is in the making but is not done yet, the PTS says. The same is true for the old 900 MHz GSM band which would be able to provide UMTS (3G) and would have a large reach with fewer stations. This is something that must be decided by the EU, but is technically easy. Today this can only be used for GSM. There is also an auction for the 2.6 GHz band where LTE can be used for mobile broadband in rural areas.

The PTS says that the biggest threat for high broadband penetration definitely is lack of competition. Lack of competition does not lower the prices, everyone must be granted access to the bottleneck resources. In order to control the market, legislation is necessary, there is no functioning marketplace for access to Telia’s network. Telia has double roles, and thus has incentives to hinder access to stop it from losing market shares. There is reason to doubt the “independence” of Skanova access. They are in the same consortium and report to the same CEO. “Chinese walls must be set up between the two”, PTS says. A law will be proposed in July (2008) which will give the right to PTS to separate the two fully.

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34 Long Term Evolution
When asked if a successful broadband market can arise without the influence of the government or authorities, the PTS replies: it has been established that this cannot happen. When the competition increases the PTS will take a step back, a long time from now. It shall be a deregulated market but first the competition must function properly.

4.5 Com Hem

The interview with Com Hem was performed with a product manager at the company.

Com Hem’s USP includes being first with delivering triple play in Sweden and having one, single customer support for its entire product portfolio. It is also completely independent of the POTS copper infrastructure as it only delivers internet via cable networks.

Com Hem explains much of its success with having understood the importance of offering services at an early stage. Since everyone connected to the cable network already had the TV-service, Com Hem managed to bundle many customers at an early stage. The company has also worked hard at establishing a solid trademark through various campaigns.

When asked about competition, Com Hem had a slightly different view than Tele2. The pressure to maintain low prices and attracting new customers was apparently two of the biggest difficulties. At a point where broadband is such an established product (the penetration is high), the most common way to retrieve new customers is taking them from other ISP’s which is very expensive. The biggest competitors were pointed out as Telia, Bredbandsbolaget and Tele2. Also, open competitors of infrastructure are a threat, as Com Hem owns all of its own infrastructure, which reaches about 40% of the market’s customers. It should also be noted that Com Hem used to be a part of the Telia consortium but was broken free.

Investments for the future include upgrading to the cable network to DOCSIS 3.0 which will ultimately led to higher speeds, something Com Hem believes to be an inevitable development of the future.

When asked about the Swedish broadband market, Com Hem reports an explosion of activity during the past couple of years. The high penetration has been helped by the development of alternate infrastructure. The representative from Com Hem also believes that Sweden has a high demand for speed and a higher willingness to pay than some neighboring countries. This demand for high bandwidth has been driven much by video and music. Even lawful downloads have increased and Com Hem believes that this will continue, but that it is up to the music companies to facilitate this process for the customer.

Finally, when asked about the future, Com Hem agrees with Tele2 that the need for fixed broadband will not decline any time soon. Wireless broadband will only complement the fix connection. In addition to this, the future will bring more features and services.

4.6 Skanova

The interviewees worked at different sections of the company and thus could together provide a full picture of the situation. The interviews will be presented together below. One of the interviewees works with the concept of “same treatment for all” which is that all customers shall be treated the same way, given the same conditions whether they are a random operator or TeliaSonera, the mother company. The second interviewee works with product management. Skanova sells different services to operators but not to end consumers. One service, “Bitstream” is a broadband service which is a basic service; operators add the connectivity services on their own and resell the service to end consumers. The other

35 Those others than Skanova. Stadsnät
major service is "IP-stream", which basically is a complete broadband service; the only thing the operator must do is to sell the service to an end consumer says Skanova.

Skanova’s customers are all treated equally when it comes to pricing and ordering, the only difference may be that large customers can get a quantity discount. However, Skanova also says that although everyone gets the same treatment when it comes to pricing, there is an information advantage for TeliaSonera. There have been cases (which have been wrongly used) where this information has been used to direct the marketing to certain customers. This is due to the fact that TeliaSonera and Skanova have access to the same information. It is hard to separate the systems. There are plans on doing that but it is unclear when and how, Skanova says.

Another problem that has been pointed out by the other operators is that the process of getting the services is slow and complicated and that that the expansion of exchanges is slow. To this Skanova answers that this is due to a tradition of old and it is taking a long time and that there are cases that take extra long time. This is partly in due to bureaucracy, but there have been attempts in trying to speed up the process. Skanova also states that they understand that there is frustration due to the old systems and TeliaSonera’s information advantage, but this is a problem that all incumbents face and it will take a lot of time and money to complete a full separation from the mother company. Furthermore, Skanova does not feel that the problems with slow expansion of exchanges still exists, which was the case earlier. There is dialog with PTS today on how to work around these problems, it is not as good as Skanova feels it could be but it is satisfactory at the moment.

When asked how Skanova looks at the Swedish broadband market, the answer was positive. We have one of the highest broadband penetrations in the world, there are many players and there are various types of infrastructures. The competition has driven the access prices down, and Skanova believes that the prices might rise in the future, because the access prices in many other countries are higher today. Skanova feels that the limitation to higher coverage of broadband is the low end consumer prices. There is no money left to make investments and today’s low prices are a result of the conditions that existed earlier. Furthermore, to be able to build a fiber network on commercial terms, the prices would have to double. Finally, Skanova sees the mobile broadband as a complement to the fixed, and the capacity in the mobile will never match the fixed.
5 Analysis

In this section, the results from the case studies will be analyzed with the results from the interviews in order to isolate broadband market success factors.

5.1 Broadband in Middle East/North Africa

The findings of the case study of the MENA countries will now be compared and analyzed to the results of the interviews made with Sweden’s ISPs, regulator and infrastructure company. Figure 2 shows the broadband penetration levels of the countries included in the MENA case study, compared to their respective GDP per capita and number of major operators. It gives a simplified overview of each market situation. For example, it is easy to see that Qatar has a high penetration level despite its monopoly, largely due to its record high GDP per capita. Turkey and the UAE, have roughly the same penetration despite their much lower GDP per capita (especially Turkey) but this has been helped by the increased competition. Saudi Arabia has quite the low penetration which can be traced back to the telecom monopoly but the fact that the country’s government has been preventing the people from reaching an unfiltered version of the internet, may also explain this unusually low level. Jordan is a prime example of how good competition and regulation can contribute to a relatively, very high broadband penetration despite the extremely low GDP per capita.

A in depth analysis of each of the MENA countries will show further how different factors have affected each country’s broadband market success.

5.1.1 Iran

When comparing Iran’s broadband penetration and GDP per capita to some other nations in the region (as presented in Figure 1), it is clear that this country has not reached its potential in this field. What is even clearer is that there are not any high expectations for this market’s future either (BMI, 2008a). Egypt presently has the same level of broadband relative its GDP per capita but is expected to increase this penetration over tenfold by the end of 2012. Iran is only expected to double its broadband penetration level.
penetration by this time. This can be compared to the country’s mobile penetration which managed to double in just one year. One undeniable difference between these two markets is the fact that broadband is dependent of the fixed line market which is still a monopoly and government owned while the mobile market has been privatized and is no longer a monopoly. This is also stated in an interview (competition is required for a market to bloom) (personal communication, Skanova). Another difference between the internet and mobile network is that the mobile network is mainly used for communication inside Iran and internet can be used to access all kinds of information and media. It has been pointed out that Iran’s government has enforced heavy censorship and a 0,128 Mbit/s speed limit on internet access. The main motive for such censors is believed to be the prevention of Iranian people accessing western influenced media. None of the benchmark countries have any restrictions on internet content or speed (except for physical limitations on speed) which shows that blocking content is limiting for the broadband development.

The effects of the government’s attitude towards high speed internet are exceptionally clear when analyzing some of the statistics in TABLE 2. Iran has the highest teledensity of all the countries in this MENA study and the third highest internet penetration which seems like terrific prerequisites for a high broadband penetration. The PTS also states that some sort of basic infrastructure must be present in order for high broadband penetration to become a reality (personal communication, PTS). However this is clearly not the case as Iran has the second lowest penetration (broadband) of all the MENA countries analyzed. The country’s high teledensity may be traced back to the pre-revolution era, when a different, more secularized government was in rule.

5.1.2 United Arab Emirates

UAE has certainly distinguished itself in many ways. It has the highest mobile penetration, the second highest broadband penetration and the fourth highest teledensity in the Middle East. This is quite impressive considering the fact that both the mobile and the fixed markets have been monopolies until early 2007 and in some ways, really still are. The factors that might explain such success include a high PC penetration and of course, GDP per capita. The broadband penetration levels can be explained by the high GDP but as prices are well above those of Sweden for example, it is clear that the lack of proper competition has prevented prices from being pushed to competitive levels. This is also backed up by the PTS which states that the biggest threat against high penetration is lack of competition (personal communication, PTS). Competition would lower the prices and thus make it more affordable for a wider range of the population. The low level of literacy and high level of GDP per capita may also indicate large differences in social class which further indicates that among the target groups that actually have a demand for PCs and broadband, the penetration is higher than what national levels indicate. If the prices on broadband were lower, this segment of the population could be reached.

5.1.3 Qatar

Qatar has the second highest broadband penetration per person in the group of MENA countries in this study. However, considering the fact that there is an average of almost 10 persons per household, compared to UAE’s little less than six persons per households, it is clear that Qatar really has the highest broadband penetration per person in the MENA study (Mastrangelo, 2008). This is even more remarkable considering that their fixed line market is a monopoly, as is the mobile while they still manage to maintain the second highest mobile penetration of all the countries studied in the MENA group. In other words, there is no competition on any of the markets that perform incredibly well compared to the rest of the countries in the region while they maintain roughly the same level of literacy and VoIP is illegal. This is somewhat a conundrum but there are explanations. One undeniable factor explaining this is the country’s GDP per capita, which is the highest in the world. Another explanation is that the Emir of Qatar has shown interest in the development of the country and has made efforts to make the country more like western countries. The PTS has also clearly stated that “it has been established that a successful broadband market cannot arise without the influence of government or authorities”, which explains Qatar’s relatively successful market with the aid of the Emir (personal communication, PTS).
5.1.4 Egypt

It is apparent that Egypt is a country going through many changes, with many ambitions. Of all the countries in this investigation, it has the second lowest GDP per capita which has reflected in low PC ownership and a low broadband penetration. The low broadband penetration may also be explained by the fact that Egypt has yet to end its fixed line monopoly, just like Iran. One big difference between these two markets however, is that there is a foreseeable end to this monopoly as well as the fact that Egypt’s government and regulatory agency are actually promoting broadband as something positive instead of hindering it (NTRA website, 2008). Although this might not show yet, it is certainly visible in a forecast for broadband penetration that BMI made (as seen in Figure 1). It is also very feasible that the government’s campaigns to increase PC ownership levels have contributed to this optimistic forecast. A high PC penetration is important as noted in one of the interviews with the PTS where it is stated that the similar “Home-PC” project in Sweden was a great contributing factor to Sweden’s success (personal communication, PTS). A more direct effect of NTRA’s enthusiastic regulation can be seen in Egypt’s mobile penetration level as it has almost surpassed that of Iran, while Iran has twice the GDP per capita. This has also been contributed to by the fact that there are now three major mobile operators in the country. The fact that NTRA has motivated its choice to sell out a second fixed license with wanting to lower the xDSL prices really shows the importance of proper competition. A monopolist operator can maximize its profits per customer by charging high prices and may therefore see no point in receiving the same amount of profits spread over a larger number of customers. Even if this is a working situation for the operator, it is not beneficial for the customers, society or of course the equipment vendor.

5.1.5 Jordan

Jordan is one of the poorer countries in the region, especially when compared to Saudi Arabia or UAE, but it is nonetheless making good progress in the broadband area. When compared to the other countries in the region in Figure 1, it is seen that Jordan has the second best broadband penetration versus its GDP per capita, and although the expected growth will not be as substantial as Egypt’s or Saudi Arabia’s it is expected to at least double to 2012. In TABLE 2 it can be seen that the PC penetration is only 5.6 % and this is definitely a limiting factor for future growth as is pointed out by the PTS. Jordan should learn from Egypt and Sweden which both have implemented subsidies on computers to make them more affordable (although Jordan has a higher penetration than Egypt, this is a good way to enable large masses with computers). The at present ruling King Abdullah II is at present facing problems with unrest with the poor population and is not taking enough action to try to improve their situation. This makes Jordan slightly more unstable than some of the other countries in the region (BMI, 2008d). If the people’s situation is not improved the chances of broadband expansion will be lowered. The incumbent operator, Jordan Telecom must be opposed with more competition in order to drive broadband prices down and make them more affordable for the people. As stated by several persons interviewed, efficient competition is the basis for a successful broadband market. Also, alternative access methods should be implemented since DSL is a very dominant access form and a variety of technologies should help lower the prices and increase the competition.

5.1.6 Saudi Arabia

Judging by Figure 1, Saudi Arabia does not perform very well broadband wise given the high GDP per capita. When compared to UAE, which has ca 60 % higher GDP (see TABLE 2) Saudi Arabia performs almost three times worse. This is probably due to the fact that the UAE has more international companies present as well as economic free zones and “smart cities”. The fact that VoIP is illegal will slow down growth and the filtering (banning) of thousands of internet pages is not something that encourages further growth (this is the same situation as in Iran). Saudi Arabia has the highest PC penetration in the region but still a staggeringly low broadband penetration; there is clearly room for improvement which is not hindered by PC penetration, and the TV penetration of 99 % (World Bank, 2008) should be an indicator that IPTV might be a driving force for higher speeds and increased spreading of broadband. This has been said in interviews with several operators; services are a driving
force behind broadband expansion. Another aspect that should not be forgotten is that many of the Saudi inhabitants are non-nationals which have come to work from poor countries and might not be interested in broadband capabilities. Saudi Arabia has to tackle the problem with the quality of their fixed lines, as many potential xDSL customers are left unconnected due to too long loop lengths. This could be solved either by installing more exchanges closer to the end consumers, start building FTTx networks which would enable much higher speeds or by deploying wireless technologies in order to enable the rural areas in an efficient way. The Saudi Telecommunications Company should be fully privatized, or at least be owned by less than 50% by the government. The new fixed line operators will hopefully help speed up the growth by inducing more competition which will lower the prices and increase the penetration. And as the PTS states, there should be parallel deployment of infrastructure of various types which will meet the customer demands in parallel.

5.1.7 Turkey

Turkey is one of the most prosperous countries broadband-wise when compared to the other countries in Figure 1. It has the highest broadband penetration versus GDP per capita for 2007. This might be due to the countries geography, with the scattered population and the low income. This might change though, as Turkey is a candidate country for EU and might become a member in a few years. Another one of the big problems Turkey has to tackle, is to make sure that operators competing with Türk Telecom have a chance of surviving and that has to be enabled by the regulator, TRA. Otherwise Turkey will see the same phenomenon that Sweden has seen in the less urbanized areas (which is that the incumbent outmatches the competition by offering prices that the competitors cannot offer due to filled telestations). This has been discussed in interviews with Tele2 and PTS and it is clear that competition must be present even in rural areas to ensure acceptable prices for the customers. Turkey has a huge potential market but the government has not yet realized the benefits of a country with high broadband penetration and a change must be made in order to accelerate the growth. Hopefully, wireless technologies, which are already being offered, will be able to increase the penetration in the rural areas faster. The biggest change though will probably occur when the TRA shows more activity and gets more action power and ability to push the government and operators in the right direction.

5.2 Benchmark countries

Below, the benchmark countries will be analyzed and compared with the interview results in order to determine what factors increase broadband penetration.

5.2.1 Sweden

Sweden is a remarkable country broadband-wise and is often seen in comparison with some of the world’s most advanced broadband countries. With a broadband penetration of 59% of households, Sweden is not the best in the world but one of the best in Europe. The country has also a high share of FTTx connections which provide very high speeds at relatively low prices. Sweden can thank its success partly to the termination of the connection monopoly in 1988 and that laws were passed in 1992 which were based on increased competition in order to reach their goals. The Swedish government has thereby played a crucial role in enabling a favorable market for broadband. Although, as pointed out in the interview with the PTS, more initiatives must be taken still, as Sweden is living off of those taken a long time ago. There has to be a constant strive for improvement and to learn from the countries that have made better progress. This is something that countries in MENA are starting to apply now, so there is reason to believe that it will take some time before they get the same progress that has been seen in Sweden. Sweden is a successful country but it is

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36 The loop length is the distance from the exchange station to the end consumer. A too long loop will be unable to carry a functioning signal or may be able to carry a very weak signal, leaving the consumer unconnected.
seen in the interviews that even though it is successful, there is still work to be done and the situation might not always be as good as it looks initially. The problems with TeliaSonera and Skanova should be resolved in order to establish an even more competitive market which is more beneficial for the enc consumers.

5.2.2 Japan

Japan is an interesting country because of the high FTTH penetration. It has managed to become a country where broadband is fast, available and cheap. One factor contributing to this is the way the Japanese make investments (Gross, 2007). While other countries often make short-term investments, which must show results within the year, or a few years, the Japanese can make investments that will bear fruit for their children, or even grandchildren. This is why they can motivate heavy investments in for example fiber, knowing that the payback will have to wait. It is also obvious that the Japanese government has played a crucial role in Japan’s broadband situation. Their secret is continuous improvement. This is also pointed out in an interview with the PTS, in order for Sweden to become even more successful, continuous improvements must be made (personal communication, PTS). Since 2000, the government has implemented program after program in order to advance in the broadband development. New goals are being set all the time in order to ensure that there is no stagnation in the development. This can be compared to Sweden, where the improvements seem to have taken a step back, as seen in the interview with PTS. This shows that the government on of the most powerful drivers in broadband development, with the power to engage the market, help the operators economically and make sure that there is a level playing field for the different operators. This also shows that without the involvement of the government, the rural areas would experience slower deployment leading to even lager rift between them and the urban population.

5.2.3 South Korea

This country is really a success story. From the first introduction of broadband services, to becoming the country with the highest broadband penetration in the world in just four years is really remarkable. This did not happen on its own though as Korea had to make some great changes in order to become what it is today. The biggest change came from the government which had decided that Korea was to set an example to the world and show what can be done by a country with a (relatively) small GDP per capita, compared to the other successful countries. By setting goals and programs Korea did what no other country has done before (Lee, Oh and Shim, 2005). Especially the “PC for Everyone” program was a very good incentive in order to enable more people with PCs and make way for a higher broadband penetration, which was also pointed out in an interview (personal communication, PTS). This is another clear sign that the government has a huge impact on the development. This can be manifested either in a good way, like Korea, or in a bad way, like Iran where the government hinders the development, filters the internet traffic and limits the speeds. An aspect that probably enabled the process to progress faster was the high population density in Korea, especially in the capital, Seoul. This means that the deployment of FTTx and DSL networks could be done faster and cheaper than for countries with tougher geographies. However, the main reason behind the extreme development is the government’s initiative and financial contribution.

5.2.4 Canada

Despite having one of the world’s lowest population densities, Canada has managed to place itself as one of the most successful broadband countries in the world. This was possible by Canada’s regulatory organ, the CRTC and the will of the Canadian government. The CRTC was responsible for devolving the monopoly and making sure that the prices were affordable, in both rural and urban areas. This shows the importance of a regulatory organ which is independent and can act to ensure a market with fair competition, making sure that the incumbents do not use their size and power to push out the smaller competitors from the market. It is also important to note that Canada, South Korea and Japan, which are considered to be successful, have set up programs not just for the procurement of broadband and connectivity but also programs to tackle the rift between urban and rural areas. Rural areas must get
broadband access in order to prevent two scenarios. One is that the incumbent is the only operator in the area and gets a local monopoly, which will be unbeneﬁcial for the consumers. This is the case in some rural areas in Sweden, which is pointed out in the interview with Tele2. The other is that there is no access at all, or that only very poor wireless or satellite connections are available, which also creates a rift.

5.2.5 France

The thing that makes France one of the benchmark countries in this report, besides the broadband penetration is the high share of VoIP subscribers. With 45% of total households having a VoIP subscription, France is the world leader in this ﬁeld (Mastrangelo, 2008). This has been possible with the work of ARCEP, France’s regulatory organ, which has ensured that the country enjoys a healthy telecom market. As seen in several interviews, it is believed that services are a driving force for expansion. The most recent sign of ARCEP’s activity was a proposition to force operators to share new ﬁber connections, ensuring that local monopolies do not arise (Arcep website, 2008). This way to encourage competition among operators is ultimately ensuring a favorable market for the consumers. Without competition, higher prices will arise, resulting in fewer and more dissatisﬁed customers. France tried in the beginning to let the market “take care of itself”, but this did not provide the results that the government had hoped for. This shows that a market will not become as successful as it could be based only on commercial grounds, which is precisely what the PTS claims in an interview (personal communication, PTS). If fast and widespread broadband deployment is desired, the government must help the telecom operators by encouraging them in different ways. This is manifested either by loans with favorable or no interest or the government guaranteeing an operator’s debt or by tax incentives.
6 Conclusion

From the analysis and comparison of the results from the interview and case study, conclusions about broadband market success factors can be inferred.

6.1 Competition

It is clear from both the case studies and interview results that competition is one of the most important factors for a high broadband penetration to be established. The competition puts pressure on the operators to constantly lower their prices, making it more affordable. This ultimately leads to a larger customer base, which generates more sales for the equipment vendor. An operator may generate the same income from a small customer base with high rates as with a large customer base with lower rates but the latter option is obviously more beneficial for the society leaving a larger part of the population with broadband, generating more jobs and increasing sales for equipment vendors.

6.2 Regulation

Not all markets may require regulation but this investigation has shown that the broadband and telecom market certainly does. As stated in interviews with Swedish telecom regulator, PTS, it has been established that an evenly balanced telecom market cannot emerge without proper regulation. Companies that were once government funded and have been privatized have too much of an advantage over the remaining market/potential competitors. This was proven clearly when even Swedish incumbent Telia acknowledged the need for an independent regulation. The independence of the regulator imperative also, as in some countries the regulator is government owned as is the telecom companies (UAE, for example). Once the market has matured, the playing field evened out and there is perfect competition, the regulator may be able to retract its involvement and take a larger role as spectator.

6.3 Government initiative

Being one of the most important factors, maybe even the single most important, the importance of government initiative is undeniable. If a government understands the benefits of a widespread broadband market, it can be realized within a few years. Korea and Japan are standing examples of this success and show how big a difference the government can make with various tools such as funding, the establishment of an independent regulator or collaborations with IT companies, such as Microsoft and Intel. The opposite is also seen in countries such as Iran or Saudi Arabia, where the government is working against a free market with uncensored internet access. Countries such as these have unusually low penetrations versus GDP per capita.

6.4 Disposable income, PC penetration and literacy

These factors may seem obvious but are nonetheless basic prerequisites for a successful broadband market. While there is no absolute level of income needed, obviously a high level of income facilitates the increase of broadband penetration, such as the case with Qatar. On the other hand, the negative effect of a low level of income can be diminished by government initiative, regulation and a healthy competition. The PC penetration is certainly a limiting factor, and closely related to income. However, it can be raised by government initiatives and subsidies. Although a PC is essential for surfing the Internet, it is important to point out that phenomenon such as VoIP and IPTV open up new uses for broadband. Finally, literacy, which may speak for itself, is a limiting factor. A second dimension for this factor is not just literacy in one’s own language and alphabet, but also the transcontinental language barriers, mainly the Chinese, Arabic, Japanese and Latin alphabet.

6.5 Infrastructure

Infrastructure is a multidimensional factor when discussing broadband market success. For one, there is an obvious need for a functioning infrastructure reaching potential broadband, telephony and television customers. It is in the findings of this study that such an infrastructure cannot be built solely on market forces, but rather needs the support from a higher force, such as the government or the EU. The difficulty here is establishing an even playing field for the operators on the market. It is also clear that
pure market forces will create a rift between urban and rural areas, leaving the rural areas underdeveloped, while the urban areas will always be connected first.

### 6.6 Urbanization

This factor is connected with the previous, infrastructure factor. A small country with a high urbanization will naturally be cheaper to equip with broadband infrastructure since more people can be connected at a much lower cost per person. In rural areas, where the households are few and far between, the cost per customer will be higher and few or no operators will be motivated to deploy there. Wireless technologies are closing the gaps, making it cheaper and easier to reach isolated customers.

### 6.7 Services

Services delivered through broadband technology have emerged in the recent years and are not as defining factors as those described above. However, it is a driving force which stimulates broadband penetration and helps operators re-innovate their business, helping them maintain and expand their customer base.
7 Discussion

The latter part of the title of this master thesis is:

“- what determines a successful broadband market?”

and the problem formulations are:

- How is a broadband market affected by different factors?
- What factors play a central role in different types of markets (e.g. monopoly, special economic circumstances)?
- Why are some markets performing better than others?

After performing a theoretical study, two case studies (interviews and market research) and then analyzing these, a list of conclusions has been reached.

1. Competition
2. Regulation
3. Government initiative
4. Disposable income, PC penetration and literacy
5. Infrastructure
6. Urbanization
7. Services

This list contains seven factors that affect the success of a broadband market in different ways. However, how big of an impact each factor has is a different question and has not been taken in to consideration. It is not reasonable that every factor should affect the market in the same way or even to the same degree. When looking at services for example, it has been established that services associated with broadband increase competition. For example, some sort of basic infrastructure is a prerequisite for broadband to even exist, whereas a factor such as services are not at all required for a broadband market to exist, although they may help it to excel at a more mature stage. Some factors even affect other factors. An example of this is regulation and competition: the PTS’, main objective is to increase the competition among ISPs in Sweden.

This study has, to the best extent, tried to answer the problem formulations, and the questions have been answered. It explains how a broadband market is affected by different factors, what factors play a central role and why some markets are performing better than others. It should however be mentioned that not all the factors must be fulfilled in order to obtain a successful market and that some factors can substitute others. Every market is unique, and by using these factors, a quick overview of the situation can be established and be used as the backbone a deeper study.

It is important, as well, to look back at the delimitations of this study. When speaking of a successful broadband market, the equipment vendor and society have been taken into consideration. The factors above may not affect the success of a broadband market in the eyes of an ISP in the same way. In fact, competition may directly limit an individual operator’s profitability as it theoretically should lower prices, increase the customer base and ultimately allow more people to be reached by broadband. This is positive both for society and for an equipment vendor selling broadband equipment to the operators.

There are interesting and related areas for future work on this subject. For one, case study research revealed that many markets such as Turkey, Egypt, Saudi Arabia and Jordan are in a very dynamic stage of broadband development. It will be interesting to follow this development and observe what takes place and what political influence is exerted. Also, some of the countries in the MENA region endorse
heavy political filtering at a time where economics and politics also are very fluctuant. Furthermore it was revealed at the end of the writing of this report that the auction for the second fixed license in Egypt was delayed until 2009. This was, apparently, due to unstable financial situation in the US and the rest of the world.

Internet has, in countries such as Japan and Korea, gone from being a luxury to being something as necessary and essential as a home telephone. This seems to be an inevitable path for most countries of the world and it will be interesting to see at what rate this development proceeds.
8 References

8.1 Interviews


8.2 Reports and Statistics


### 8.3 Websites

8.4 Literature


Appendix 1

Interview guide for operators

- What is your position at OPERATOR?

- Does OPERATOR have any unique selling point or market advantage? Which?

- What makes and has made OPERATOR successful?

- What are OPERATOR’s biggest competitive problems?

- What drives OPERATOR’s expansion
  - When looking at customers
  - Larger networks
  - Services

- How does OPERATOR see the Swedish broadband market?
  - What do you believe is the reason for this?

- What does the future look like for OPERATOR
  - In form of customers and subscriptions?
  - Network
  - Services

- Out of network operator, communications operator and retail service provider, what roles does OPERATOR have?
  - How do you feel about this scenario? Is there anything you would like to change about it?

- Who does OPERATOR view as their biggest competitor?
  - What advantage does each company have?

- What do you perceive as your biggest limitation when it comes to expansion?

- How does network operator(s) affect your business?
  - What difference has become noticeable since the separation of Skanova 2008-01-01?
  - Does OPERATOR rent fiber from the municipal networks? Do you own all of your infrastructure?

- How does the equipment vendor affect your business?
- With prices?
- With functionality?
- With quality?

- What is your view of the future with mobile broadband?
  - What will be prioritized for the future?
Appendix 2

Interview guide for the Post and Telecom Agency

- What position do you have at the PTS?
  - What is your job description?
  - How long have you been working at the PTS?

- What role does the PTS have in today’s broadband market?

- What role has the Swedish government had during the rollout of the broadband network in Sweden?

- Which factors do, according to you determine if a country will get high internet coverage?

- Which factors do, according to you determine if a country will get high penetration?

- In what way is Telia hindering the other operators?

- How should the initiative be increased to enable more broadband connections?

- What problem is the most likely to stand in the way of high broadband penetration?

- In what way can authorities promote competition and the expansion of broadband?

- Is it possible to control the market through legislation or is a functional separation or other division required?

- How can a broadband market with high penetration emerge without external influence from authorities etc?

- How can the ”Telia-situation” be avoided (government financed network)?

- How much of the equipment has been government financed?

- What role do services play in the competition (IPTV, VoIP)?

- What future services and technologies do you believe will affect the competition and the market?
  - How will the services affect the future broadband situation?

- What are the prospects for wireless and wireline broadband?
• Who is deploying most fiber networks in Sweden?
  o Who is renting from these?
  o Can everyone rent the fiber at the same conditions?
  o Is any new copper being deployed at all anymore?

• When do you think that fiber will be the dominant form of broadband access in Sweden?
Appendix 3

Interview guide for Skanova

- What is your current position at Skanova?
- What is your job description?
  - How long have you been working there?
- What is Skanova's goal and purpose?
- Which services and products do you offer?
- Do all operators have to go through you to be able to offer telephony services?
- Do you provide any services or products to end consumers?
- Who are your largest customers?
  - What do the customers buy?
- Does everyone buy the services at the same conditions?
- What is Skanova's relation to Telia?
  - How was the relation before the separation from Telia?
- What was the reason for the separation?
- What does Skanova have in common with Telia today?
- What do you think is the biggest threat against high broadband coverage in Sweden?
- What do you think is the biggest threat against high broadband penetration in Sweden?
  - What is the single most important factor for high broadband penetration?
- What is Skanova’s view on the Swedish broadband market?
- What are the prospects for Skanova?
- Some operators say that it takes long time to activate services such as DSL for example, what is your view on this matter?
  - Has the separation from Telia contributed to these delays?
o Is this something you are working on improving?

- The PTS say that the cooperation with the expansion of the exchanges is slow, what is your view on this matter?

- What is the relation to the PTS like today?
  - Do you cooperate to improve your services and products?
  - What kind of influence does the PTS have on your business?

- Telia was earlier offering a product called "dark fiber" which no longer exists, why is it not offered anymore?

- What is your prospect on wireless and fixed broadband?