POST & TELESTYRELSEN

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The Swedish telecommunications market 1999

Foreword

Developments in the Swedish telecommunications market are continuing in a positive direction. The market is increasing in value, the number of active parties continues to increase and competition is stiffening. This is indicated by the analysis conducted by the Post and Telecom Agency, PTS, for the sixth year in a row.

The ever-increasingly dynamic telecommunications market provides the consumer with greater choices and lower prices. At the same time, consumers in Sweden are communicating increasingly. The proportion of consumers who use both fixed and mobile telephony and also the Internet continues to grow. In order to satisfy the desires of the consumer and to survive the continuously tougher competition, it is becoming more important for telecom operators to develop new services and to become full-service suppliers, i.e., able to offer package solutions with fixed and mobile telephony and also the Internet.

During 1999, a number of measures to promote competition were implemented such as preselection, new foreign prefix and number portability for fixed telephony. The Agency produced three proposals for legislative amendments in order to incite competition: a proposal for the obligation to lease network capacity within mobile networks, a proposal on national roaming in the mobile network, and a proposal for an obligation to lease access networks. Now that the movements in the telecommunications market during 1999 can be summarised, it is particularly pleasing to observe that:

- just over 1.4 million subscribers were preselection or prefix customers at the turn of the year
- the number of telecom operators offering fixed telephony has doubled in one year
- the price of calls to other area code areas, to mobiles and abroad has decreased
- the price for mobile calls has started to reduce, after years of rather constant and, from the international perspective, high levels.

The changes in the telecommunications market provide the consumer with new opportunities, but at the same time new demands are imposed on the consumer. The range of services offered by telecom operators is complex and it is often difficult for an individual to compare prices for example. PTS therefore wishes to prepare a price comparison during the second half-year of 2000. The aim is to assist the consumer to actively select a telecom operator, which will increase competition.

However, there are still some problems in the Swedish telecommunications market that limit the opportunities for telecom operators to compete on equal terms. Access to certain infrastructure is a great problem that has not yet been resolved. PTS will continue its work with this key issue during 2000.

Nils Gunnar Billinger
Director General

Summary

For the sixth year in a row, the Post and Telecom Agency, PTS, has conducted a market analysis relating to the development and competition situation in the Swedish telecommunications market. The main purpose is to survey and analyse developments during 1999. Comparisons are made in the report, referring as far back as 1994, regarding important events that have or will occur during 2000 and also some views looking forward over the next two to three years. The study surveys the following sub-markets: fixed telephony, mobile telephony, network capacity, and includes also a short overview of the Internet market.

In 1999 there were approximately 100 active undertakings in the market for telecommunications in Sweden. The majority of parties are active within the field of network capacity, which comprised approximately 80 active enterprises during 1999. Approximately 30 active undertakings provided fixed telephony services while 4 undertakings provided mobile telecommunications services.

The market has grown both as regards the number of parties and in value. Since the market was opened, telecom operators have focused on obtaining a large customer volume with prices as a primary means of competition. More parties and stiffer competition have resulted in even more options for the consumer, numerous price plans, rapid price changes, services that are integrated and overlap each other. If the various options cannot be compared, it is difficult for the consumer to make the right selection without assistance.

The market for fixed and mobile telecommunications services grew in value during the year by approximately 8% and amounts to approximately 38,700 MSEK, of which fixed telephony services amount to 67% and mobile telecommunications services to 33%. The market for fixed telephony services increased by approximately 1,000 MSEK during 1999, from 25,000 MSEK to 26,000 MSEK. The largest sub-markets are comprised of national calls and fixed charges: 35% and 34% respectively. It is also these markets that are characterised by the least competition. With a market share of 87%, Telia still dominates fixed telephony services. The price for fixed telephony services has continued to reduce during 1999, which applies to all kinds of calls. However, particularly great focus has been placed on calls from fixed to mobile networks where the operators are competing strongly.

The most important individual event during 1999 was unquestionably the introduction of preselection on 11 September. Preselection meant more parties, stiffer competition with price reductions as a consequence together with more aware individuals. However, the implementation of the preselection reform itself was linked with problems between the various telecom companies, between the telecom companies and their customers and also between the telecom companies and PTS.

The market for mobile telecommunications services increased by 1,900 MSEK during 1999, from 10,800 MSEK to 12,700 MSEK. Even the market for mobile

telecommunications services was dominated by Telia, which had a share of 55% of the market. It is losing ground to its competitors Tele2/Comviq and Europolitan, which had shares of 21% and 24% respectively. The number of subscriptions increased by just over 1 million, where the majority comprise pre-paid cards, which today amount to almost 2 million subscriptions. Up to and including the first half-year of 1999, price levels for the various forms of subscription were largely unchanged. There was a variation between various subscription price structures rather than a general price reduction. During the second half of 1999 and up to and including today, a downward trend in pricing has commenced.

During 1999, a new undertaking commenced providing mobile telecommunications services, Tele1 Europe, which by a contract with Telia could start to act as a service provider in relation to its target group. A further service provider, Sense, was also added during 2000. Access to mobile telecommunications services in an operator's range of services is becoming increasingly important and the majority of telecom operators feel that the current situation in the mobile telecommunications market is a major problem.

Access to infrastructure is a precondition for a telecom operator to be able to provide telecommunications services. The existing infrastructure today is in the form of copper, co-axial, optical fibre and also through various radio-based solutions. Telecom operators can obtain access to infrastructure from network owners by purchasing network capacity in either basic, i.e. without terminal equipment or value-added form. Telia is also the dominating party within the market for network capacity. The existing undertakings feel that competition is very stiff for network capacity in the form of black fibre and higher bandwidths. Furthermore, competition is stiffest in urban areas and also between urban areas. As regards access to the local loop, this still has great problems. As such a small part of the existing market is profitable to directly connect for anyone other than Telia, the alternative telecom operators are denied access to a great part of the revenues in the market. They also have limited opportunities to offer comprehensive solutions, to further enhance the customers' existing telecommunications services and also to package with, for example, the Internet and other data communication.

It was hoped that LLUB[1] would be introduced in accordance with the legislative proposal the PTS submitted to the Government. However, the legislative proposal is undergoing an investigation whether or not the introduction would conflict with the Fundamental Law on Freedom of Expression, which means that any introduction is presently postponed. Through LLUB, the introduction of number portability, which was introduced on 1 July 1999, would have a greater effect in the market than at present.

At the end of 1999, there were approximately two million dial-up accesses to the Internet, which is an increase of approximately 30% since 1998. In addition to this

1 Local Loop Unbundling (Access to the local loop)

there are a further 3,800 connections via leased lines and approximately 40,000 through other forms of access such as ADSL and via the cable television network. Of the market value of 200 MSEK, Telia had a share of approximately 34%, Tele2 approximately 29%, Telenordia approximately 16% and other parties together 21%.

Against the background of this market analysis, PTS can conclude that the competition situation has improved within all segments of the telecommunications market. Stiffer competition of course means lower profit margins and, to survive in the long term, telecom operators need to develop their businesses. However, there are several conditions in the market that still limit the competition opportunities of the telecom operators and which should therefore be monitored. These limitations primarily concern access to infrastructure.

Contents

1. Introduction

The Post and Telecom Agency, PTS, has the task of monitoring the development and competition situation in the Swedish telecommunications market. As a part of this responsibility, PTS has annually, by procurement, implemented a market analysis. These studies have been conducted by:

1994: PA Consulting Group
1995: Bohlin & Strömberg
1996: AB Stelacon
1997: AB Stelacon
1998: Öhrlings PriceWaterhouseCoopers

The intention of these studies is primarily to describe any changes that have taken place in the market during the year 1999. PTS has on this occasion prepared the report using internal resources.

This year's market analysis describes the following segments:

- Fixed telecommunications services
- Mobile telecommunications services
- Network capacity
- The Internet
- Current legislation and possible amendments
- Future development and trends

1.1 Aims and limitations

The main purpose of this study is to survey and analyse developments in the Swedish market for telecommunications during the year 1999. As several significant events occurred in the early part of the year 2000 we have chosen to cover and comment on them also. The study relates to the market throughout Sweden. Those market segments that have been surveyed basically correspond with the segments governed by the Telecommunications Act, i.e., fixed telephony, mobile telephony and network capacity. A short overview of the Internet market has also been provided. In this report, definitions and terminology are attributed the same meaning as in the Telecommunications Act.

The content of this study corresponds with, to the greatest extent possible, the previous studies of the Swedish telecommunications market that have been conducted. In those cases where PTS has deviated or adjusted previous information, there is a comment where such differences and reasons for the changes are indicated.

The study contains both a historical description and a future-orientated assessment. The market is described historically as of 1994, when this study was conducted for the first time, and future trends are assessed on the basis of a time perspective of two to three years.

Views have been presented during interviews concerning PTS's role in the market and as we consider this should also be included as a part of this survey, we decided to compile some of these in a special section at the end of the report.

This part of the report, which describes the Swedish Internet market, is brief in comparison with the other parts. The Internet is an area that has high priority, both with PTS and the Government, and is the subject of several other investigations. Consequently, only an overview of the Internet market is provided in this report. Among other things, PTS has written the reports *Operation of the Internet in Sweden independent of functions abroad* and *Risks for monopolisation of broadband services in apartment blocks*.

As regards the introduction and effects of preselection, PTS has limited itself to dealing with market effects and has only briefly stated views concerning implementation and PTS's role in this connection. This was the subject of a special investigation by PTS and we therefore refer the reader to the results of that report. At the time of writing, PTS is also conducting a market survey of the effects of preselection. The results of this investigation will be presented on 11 September 2000.

Any further limitations and clarifications are mentioned in the respective sections.

1.2 Implementation

There is a substantial amount of information currently held by PTS that is considered to be sensitive market information under the Secrecy Act and to which the public consequently does not have access. The material that forms the basis of this analysis has thus been gathered solely for this purpose. The study is primarily based on information collected from:

- Approximately 40 interviews with parties in the market
- Quantitative facts that the parties have themselves submitted to PTS
- Annual reports
- Searches on the Internet
- Quantitative/qualitative facts collected from market surveys and analyses that PTS has arranged to be carried out in other connections, for example follow-up of preselection conducted by Demoskop, the Swedish market for mobile telephony conducted by SKOP
- Analyses that PTS itself has conducted relating to the fields covered by this study
- The studies conducted previously relating to the development of the market and competition situation

The companies and organisations that were interviewed represent various kinds of parties in the market for telecommunications in Sweden. The companies have been selected with a view to cover as large a part of the views of the market as possible. They differ from each other as regards activity, corporate size, geographic operational area, target groups, ownership structure, etc. The opinions and views presented during the interviews have primarily been used as a basis for our conclusions and overall assessments, i.e., opinions of individual companies cannot be identified from the report. The interviews were conducted during the period 13 April to 31 May 2000, of which the majority were conducted in conjunction with personal visits.

The sources of numbers regarding, for example, turnover, market shares and price development have partly been collected from the operators directly, partly taken from annual reports, the Internet and various market surveys.[2] The information has been collected for the years 1994 – 1999 when companies were also given an opportunity to comment, and if necessary, correct values previously supplied.

[2] Sensitive market information is classified as secret under Chapter 8, Section 6 of the Secrecy Act.

2. The telecommunications market

The overall objective in the telecommunications market is that private people, organisations and authorities should have access to efficient telecommunications at the lowest possible socio-economic cost. This means a reasonable price, on equal terms, and also that the telecommunication should be sustainable and available during war and situations of crisis. According to the Telecommunications Act, an important means for attaining this is to create a market that is characterised by properly functioning competition between interested parties.

According to Section 5 of the Telecommunications Act (1993:597), an interested party who intends to provide telephony services to a fixed network termination point, mobile telecommunications services, other telecommunications services that require allocation of capacity from the numbering scheme for telephony[3] (e.g. premium rate calls and directory enquiries), together with network capacity, should give notice of this to PTS before the service is provided. The notification obligation was introduced on 1 July 1997 with the purpose of facilitating the entry of new enterprises into the telecommunications market.

Besides the obligation to notify, a licence is required for a telecom operator who provides, in a public telecommunications network telephony services to fixed network termination points, mobile telecommunications services or network capacity, if the operation is of substantial scope having regard to the area covered, number of users or other comparable circumstances. A general rule when assessing whether or not a telecom operator conducts activities to a substantial extent is whether the party in question holds at least 10 – 15% of the relevant telecommunications market within which the undertaking is active. The relevant market referred to may be assessed from case to case; it may thus involve, for example, the entire national market for fixed telephony services but it can also be assessed on the basis of various geographical areas. PTS decides whether a telecom operator is subject to the licence obligations.

Besides the Telecommunications Act and Regulations, there are special conditions prepared for those telecom operators that hold licences[4]. The purpose of the licence conditions is to impose upon certain operators special obligations, on the basis of the Telecommunications Act. All applicable conditions expired on 31 December 1999 and new conditions were introduced on 1 January 2000. When formulating these conditions, regard has been paid to new market conditions. The current obligations under licences and the length of the term varies depending upon the telecommunication operator's current position in the Swedish telecommunications market. The term of validity varies from two years up to and including six years. The terms of licences basically cannot be changed during the term of validity, although there are exceptions if a reservation has been made in

[3] According to Section 37, Telecommunications Act

[4] The licence conditions comprise, for example, emergency calls, service requirements, quality requirements and coverage requirements

the conditions. Examples of what new conditions contain are that telecom operators have an obligation to inform PTS about new ownership structures and also an increased obligation on to mobile telephone operators to upgrade as regards new data transfer services in the mobile network. Mobile telecom operators have, as of 1 January 2000, an obligation to provide a data transfer service, with the same level of coverage as the current GSM network, within two years after the commercial launch in test areas, subject to the precondition that the data transfer service is provided commercially in the mobile network within two years following the launch.[5] The decision by PTS has been appealed against to the County Administrative Court.

Between 1 July 1997 and May 2000, 187 undertakings have applied for one or more of the services subject to the duty to notify. During the year, 12 undertakings have withdrawn their notifications and one undertaking has gone into bankruptcy, which means that at present 176 undertakings have given notice.[6]

	Applications	**Licence holders**
Fixed telephony service	91	13
Mobile telecommunications service	20	10
Other telecommunications service	52	13
Network capacity	112	8
Total	275	31

As indicated by the table above, the number of notifications is more than the number of undertakings that have notified. The reason for this is that one company can apply for several services.

Of the undertakings that have notified, only 85 undertakings have revenues in 1999 from activities subject to the Telecommunications Act. Together, their turnover was just more than 100 MSEK from telecommunications services, where approximately two-thirds was derived from the provision of network capacity.

The current Telecommunications Act (1993:597) is structured on the basis of some 20 EU directives, for example the Interconnection Directive or the Voice Telephony Directive. These directives are now the subject of a comprehensive investigation within the EU Commission where new directives will be formulated and subsequently implemented nationally. Preliminarily, this work will result in the following five directives:

[5] Coverage requirements; NMT 450 shall cover at least 95% of the surface area of Sweden (with the use of a 15W vehicular mounted terminal), GSM 900 shall cover all Europe Roads together with urban areas having at least 10,000 inhabitants, GSM 1800 shall cover all Europe Roads and urban areas that have a population of more than 50,000. During 1998, Telia decided that the NMT-network (NMT 900) should be phased out and closed not later than December 2000.
[6] For an updated list of reported enterprises see http://www.pts.se

- The Data Protection in the Telecommunications Sector Directive
- The Licencing Directive
- The Interconnection/Access Directive
- The USO Directive
- The Framework Directive

The Member States will obtain proposals for the formulation of the directives in June this year and negotiations will commence thereafter. According to the current time schedule, the adoption of the directives will take place successively throughout 2001. Further information is available on http://www.ispo.cec.be.

2.1 Description of the market

Those telecom operators who are active in the telecommunications market in Sweden, and subject to the Telecommunications Act, offer services at various levels within the value chain. The basis for being able to create services for end users, for example telephony services, is access to network capacity. Network capacity can be obtained from underground cables in the form of copper, co-axial and also optical fibres, by suspended lines, in that case primarily as optical fibre at the top of power lines, and also from radio-based solutions such as radio link. Network capacity is sold both in basic, i.e. without terminal equipment, and value-added.

The parties currently within the telecommunications market can be divided into various levels of the value chain. There are suppliers of network capacity who provide either basic or value-added network capacity, service suppliers and distributors for service suppliers. The latter type of party thus purchases traffic sales from undertakings with their own network resources in order to package and market, for example, telephony services and Internet services.

The sales channels used by telecom operators in order to reach the end user are their own sales staff, customer services, distributors, shop chains, agents, etc. These channels are used independently of which target group and services are to be covered.

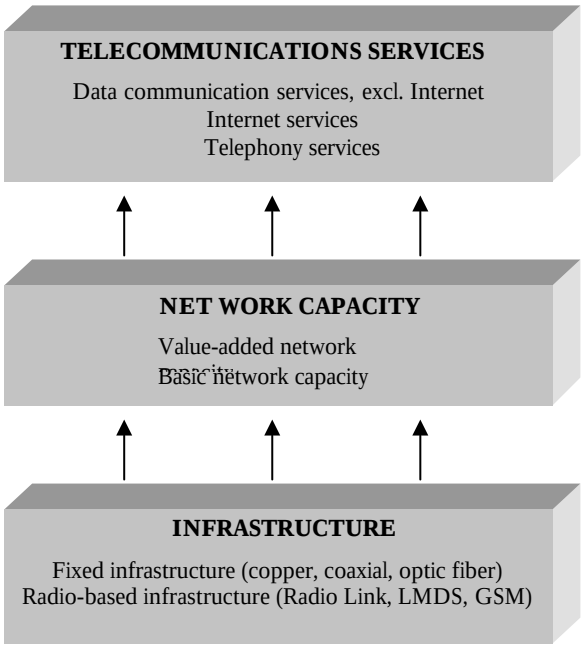


Diagram 1: **The market for telecommunications, from basic network capacity to telecommunications services**

The market for telecommunications may be evaluated in many different ways. PTS has chosen to define the market on the basis of the service that the end users consumer, i.e. the revenue that the telecom operators obtain from the end users. This thereby excludes any revenues that telecom operators obtain from other telecom operators for using their networks, so-called interconnection revenue and sales of traffic minutes.

2.2 Market volume

During 1999, the market for fixed and mobile telecommunications services had a turnover of 38,700 MSEK. This is an increase of approximately 8% during the past year, which is a little under the average annual growth for the last five years, which amounts to approximately 10.2%. Between 1994, when the market was valued at 24,000 MSEK, and 1999, the market has grown by approximately 62%.

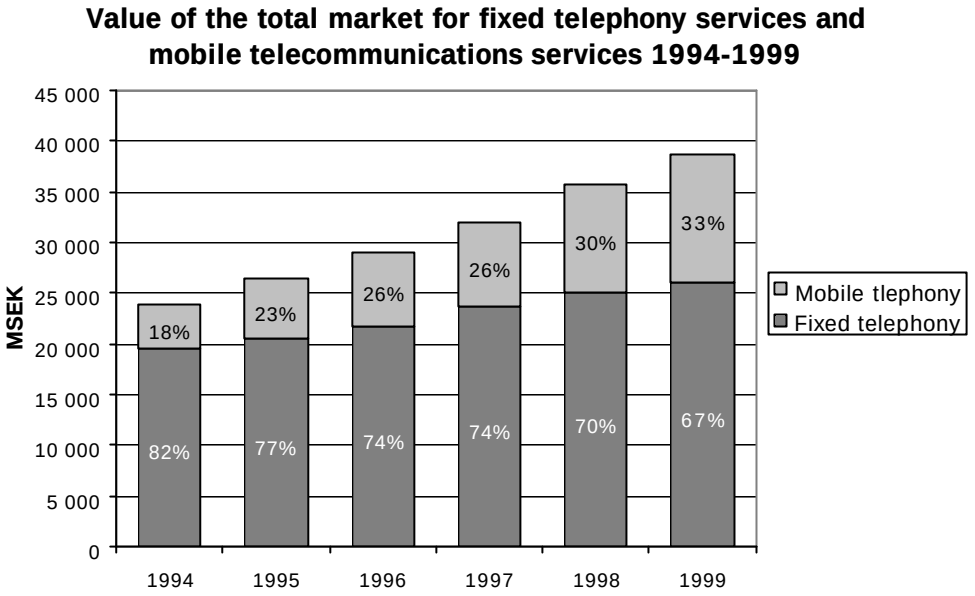


Diagram 2: **The market for telecommunications in Sweden 1994 – 1999. Excluding interconnection revenues and traffic sales to other telecom operators.**

During 1999, the value of the market has developed as previously. Both the market for fixed telephony services and mobile telecommunications services are increasing in value. The market for fixed telephony services has a turnover of 26,000 MSEK during 1999, which is a growth of 3.5% during the past year. The market for mobile telecommunications services is continuing to increase its share of the total telecommunications market and comprised at the turn of the year 33% of the total value. The market for mobile telecommunications services had a turnover of approximately 12,700 MSEK, which corresponds to a growth of 18% during 1999. It should also be added that the number of traffic sales continues to increase for both fixed telephony and mobile telecommunications services, and this is occurring at a more rapid pace than revenues.

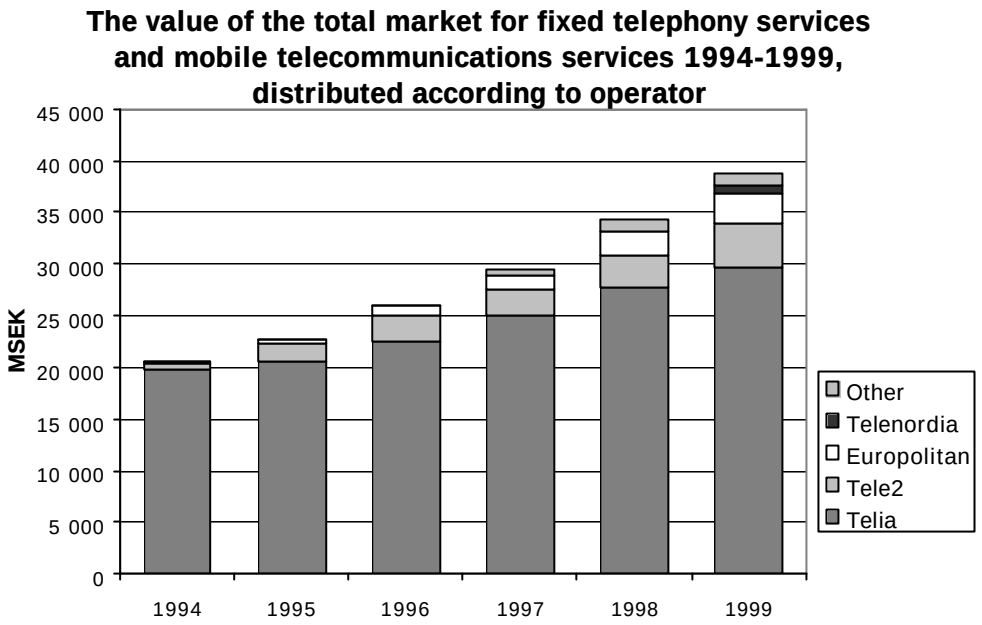


Diagram 3: **The market for telecommunications in Sweden 1994 – 1999, distributed according to operator. Excludes interconnection revenues and traffic sales to other telecom operators.**

There has not been any marked change in the past year as regards the major parties on the Swedish telecommunications market. Telia holds a share of the total market of approximately 77%, which is a reduction of four percentage units compared with 1998. This means that Telia continues to lose market shares to its competitors. Its major competitor is Tele2, whose share of the value of the market amounted to 11%. Europolitan is the third largest telecom operator with a share of 8% and thereafter comes Telenordia with a share of the market of almost 2%. Other smaller telecom operators had in total a share of just under 3%.

3. Fixed telephony

During 1999, there was great activity in the market for fixed telephony services. The primary reason for this was the introduction of preselection, which entered into force on 11 September, at the same time as the international prefix was changed to 00. All telecom operators worked in advance, in conjunction with, and after the preselection reform, to obtain the largest customer stock possible. Tough marketing, customer contact and information dissemination resulted in an increasingly large proportion of the Swedish population becoming aware that there were several alternatives available in the market.

3.1 Parties

The number of active telecom operators in the market increased. Viewed totally, there were some 30 undertakings that provided fixed telephony services in public telecommunications networks during 1999. In April this year, there were 13 undertakings who, in accordance with the Telecommunications Act, had licences to provide telephony services to fixed network termination points – this figure has remained unchanged for the last three years. The following companies currently have licences to provide telephony services to fixed network termination points:

- Telia AB
- Tele2 AB
- Global One Services AB
- MCI WorldCom AB
- RSLCOM Sweden AB
- StjärnTVnätet AB
- Telenordia AB
- Facilicom International Sweden AB
- Tele1 Europe Holding AB
- Sonera Sverige AB
- TeliTel AB
- CallMedia Telecom CMT AB
- NETnet International S.A.

Besides the licence holders, there are approximately 20 undertakings notified who, to varying extents, conducted activities within the field during the year. The undertakings notified include, among others, Utfors, Glocalnet, Optimal Telecom, GTS, Rix Telecom, Telerian.[7]

[7] See list on http://www.pts.se

3.2 Market volume

The market for fixed telephony services consists of fixed subscription charges, call charges for telephony, telefax and data communication with low-speed modem.

The value of the market for fixed telephony services amounted to approximately 26,000 MSEK during 1999, which can be compared with approximately 25,000 MSEK for the preceding year. The total value of the market was distributed approximately equally between the business and private market.

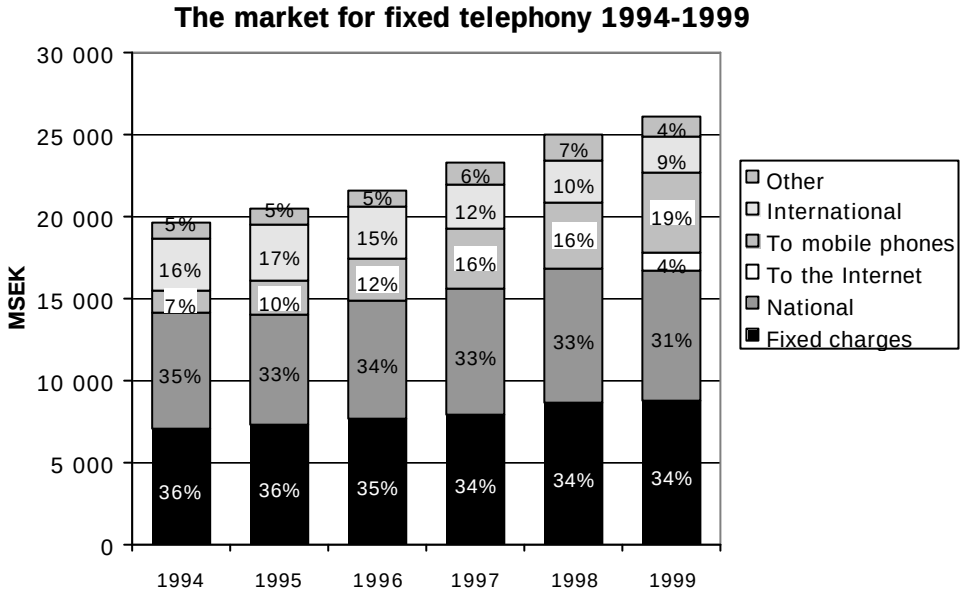


Diagram 4: **The market for fixed telephony services 1994 – 1999. Excluding interconnection revenues and traffic sales to other telecom operators.**

The turnover of fixed charges represents 34% of the total market value. After this comes national traffic which represents 31%. It is worth noting that traffic to the Internet has been reported separately during 1999, which had not been done previously. During the autumn of 1999, the majority of telecom operators introduced a special tariff for modem-connected traffic via the Internet. This value comprises approximately 4% of the total value of the market but does not correspond to the entire traffic to the Internet as telecom operators have not had the opportunity for separate reporting during the entire year. Previously, all revenues from Internet traffic were included in the total revenue for national calls. If this is done in the same way for 1999, this market is the greatest with a share of 35%. This is an increase of two percentage points over the previous year, which is partially explained by a growth in Internet calls. Calls to mobile phones comprise 19% of the market, which increased by three percentage points during the last year. Otherwise, revenues included are primarily from freephone and premium rate services, which had a proportion of the total market of just over 4%. Note

that the latter market has reduced in value by approximately 500 MSEK, which is the result of, among other things, price reductions and to some extent also volume reductions.

3.3 Market shares

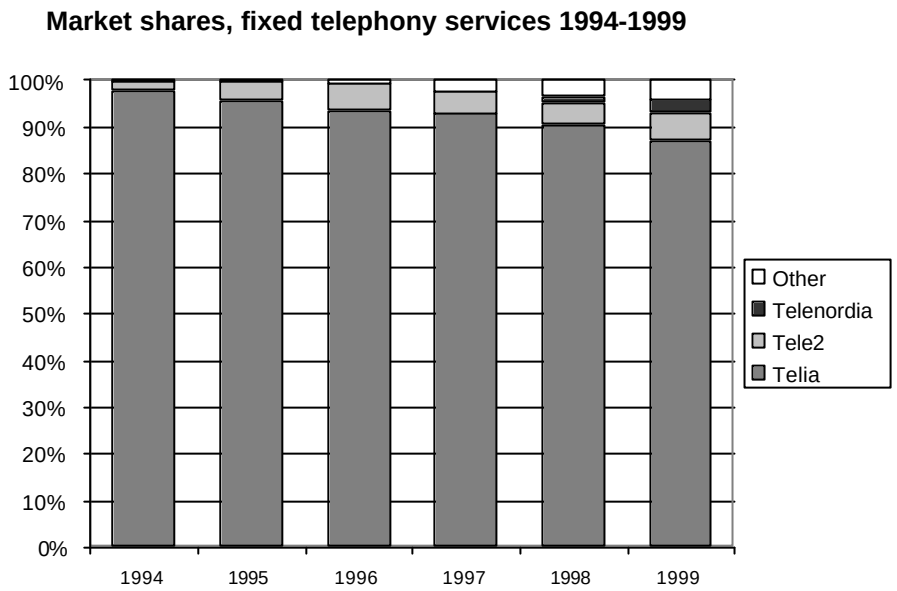


Diagram 5: **Market shares, fixed telephony services 1994 – 1999.**

The market for fixed telephony is the sub-market for which Telia has the greatest share. During 1999, its market share amounted to 87%, which is a reduction of three percentage points compared with 1998. Tele2's share has increased by one percentage point to 6%. The third largest telecom operator share, Telenordia, amounted to almost 3%. Other telecom operators had in total 4% of the value of the market.

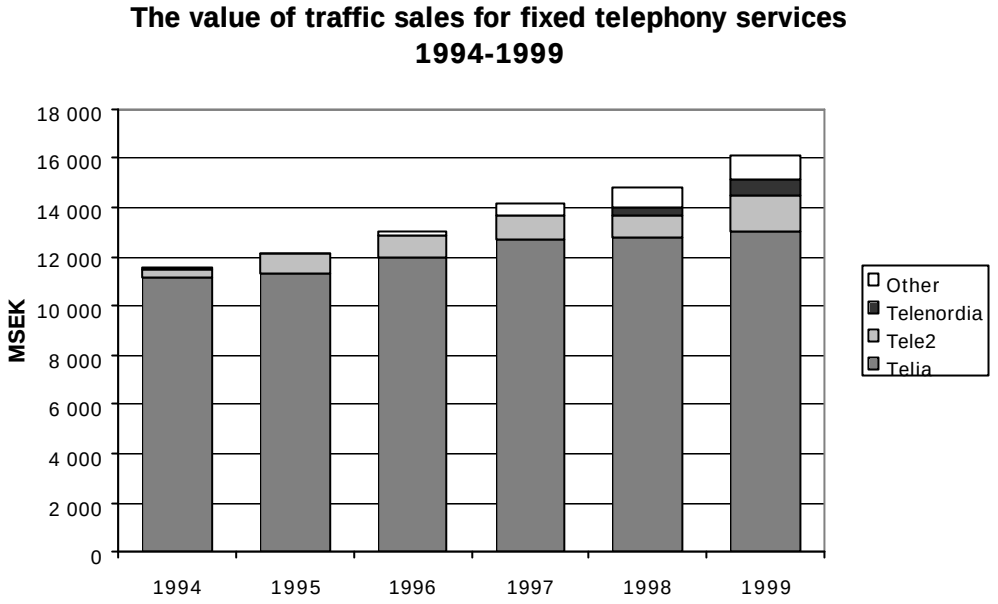


Diagram 6: **Market shares, traffic for fixed telephony services 1994 – 1999. Excluding shared-line revenues and traffic sales to other telecom operators.**

In order to monitor the development of competition within fixed telephony services, we also chose to compute the market share excluding fixed charges. The reason is that fixed charges, for the greater part, consist of subscription revenues. As, in broad terms, all subscribers are directly connected to Telia, fixed charges are not available for other telecom operators. Of fixed charges, Telia has a market share of approximately 99%.

Limited to traffic sales, Telia has a market share of 81% of the revenues for call minutes. It has thus lost six percentage points compared with 1998, when its share amounted to 87%. Tele2 has a 10% share, Telenordia 4% and other parties have in total 6% of the market.

The above shares can be compared with 1994, when Telia had almost 97% of total market revenues for call minutes.

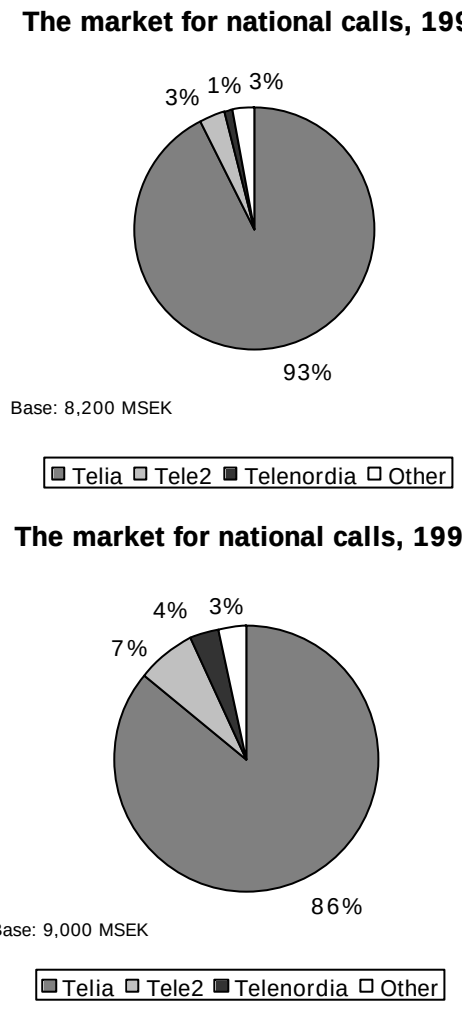


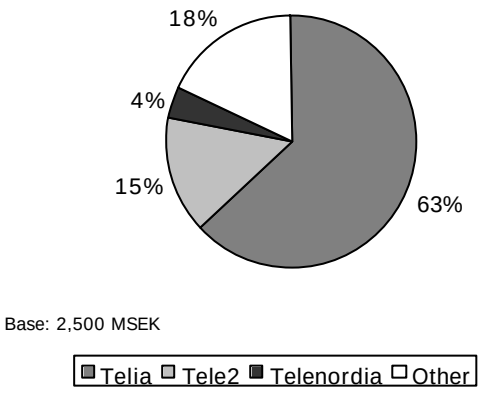
Diagram 7: **Market for national calls, 1998 and 1999. Excluding interconnection revenue and traffic sales to other telecom operators.**

The market for national calls, including the Internet, increased in value by just over 800 MSEK during 1999. This is the kind of traffic that has increased most during the year. It has not been possible during the last two years to describe the development of national calls distributed between local calls and Sweden calls. The reason is that several telecom operators no longer make this distinction. On the basis of some values collected, PTS assesses that 75% of the value for national calls comprises local calls, i.e., a call within one and the same telephone code area.

As described later, there is still an imbalance in the competition situation between Telia and other telecom operators. And this imbalance is different, depending upon whether it is a call within one and the same area code area or whether it is a call that stretches between two different area code numbers. From the viewpoint of PTS, it would therefore be preferable if it was still possible to conduct this measurement on the basis of previous call divisions.

As regards the share of revenues from national calls, Telia is still the clearly dominant party with 86% of the market. However, it has reduced its share by seven percentage points in relation to other operators during the last year. Tele2 has increased its share by four percentage points and had 7% of the market during 1999. The third largest party was Telenordia, with a share of approximately 4%, other parties having in total approximately 3% of the market.

The market for international calls, 1998



The market for international calls, 1999

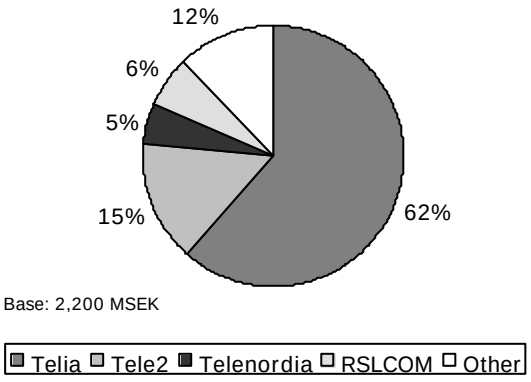
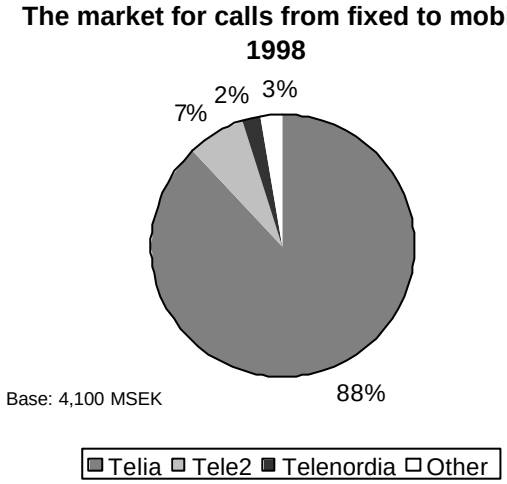


Diagram 8: **The market for international calls, 1998 and 1999. Excluding interconnection revenue and traffic sales to other telecom operators.**

The value of the market for international calls during the last three years has decreased by 200 – 300 MSEK per year and amounted during 1999 to just over 2,200 MSEK. This is the market that was the first that was exposed to severe competition, and it is also with this kind of traffic that the least changes in the distribution of market shares are observed. It has not been able to compensate the great price reductions that have been implemented with volume increases.

According to the telecom operators, there are still margins for price reductions, which probably means that the total revenues from this kind of traffic will continue to reduce for some years to come.

Telia's market share for this kind of traffic decreased by one percentage point during 1999, from 63 % to 62 %. Tele2's share is unchanged at 15 %. The third largest telecom operator, on the basis of revenues from international calls, was RSLCOM with a 6% share. Telenordia increased its share to 5 %, i.e. by one percentage point. The other telecom operators had in total 12 % of the value of the market.



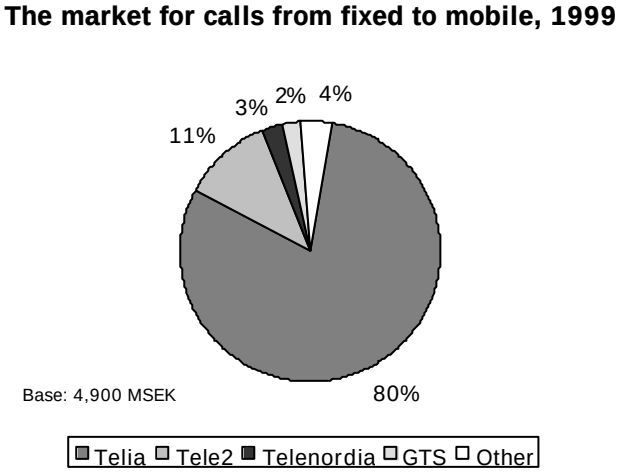


Diagram 9: **The market for calls to mobile telephones, 1998 and 1999. Excluding interconnection revenues and shares of traffic sales to other telecom operators.**

During the last year the market increased for calls from the fixed network to the mobile by approximately 800 MSEK, the value of which amounted to almost 4,900 MSEK. During 1998 the market increased by just over 400 MSEK, while the increase between 1996 and 1997 was as much as 1,200 MSEK.

It has become significantly more expensive for a subscriber to make a call from the fixed network to the mobile network than to make an ordinary national call and the majority of international calls. Although the number of mobile telephones has greatly increased, consumers were aware that this particular kind of call was very expensive and usually refrained from ringing from a fixed telephone to a mobile. In conjunction with stiffer competition and new opportunities for telecom operators within fixed telephony services to reduce expenses for this kind of call, significant reductions in price also resulted in great price differences between the operators during 1999. However, lower prices were compensated for by increased traffic volume.

The opportunity for price competition, increased marketing by the telecom operators, a greater awareness on the part of customers regarding this expense, at the same time as preselection was introduced, were causes for competition having increased most for this kind of traffic.

Although Telia has increased its revenues from this kind of traffic by 300 MSEK, it has lost eight percentage points, from 88% to 80%, during 1999. Tele2 has increased its market share by four percentage points, from 7% to 11%. Telenordia's market share amounted to 3% and GTS's to 2%. Other telecom operators had in total a share of 6% compared with 3% during 1998.

3.4 Subscribers

There are approximately 6 million subscribers to fixed telephony services, excluding business switchboards. Of these, approximately 4 million are private subscriptions and 2 million are commercial subscriptions. The number of commercial switchboards amount to approximately 140,000. In broad terms, virtually all households are still directly connected to Telia, which means that the main part of this market's subscription revenues goes to Telia. There are approximately 4,000 subscribers who are connected directly to some other telecom operator, of which just over 2,000 are private subscriptions and 2,000 are commercial subscriptions.

It was estimated that there were 750,000 subscribers who were directly connected to some telecom operator other than Telia at the end of 1998. This can be compared with just more than 1.4 million subscribers at the turn of the year 1999/2000. Approximately half have chosen another operator by so-called preselection and the other half use prefixes in order to reach the chosen telecom operator's network. Note that a subscriber can be both a preselection customer and a prefix customer with various telecom operators, which means that 1.4

million indirectly connected subscribers is not the same as the number of different customers.

Distribution of indirectly connected subscribers, 1999

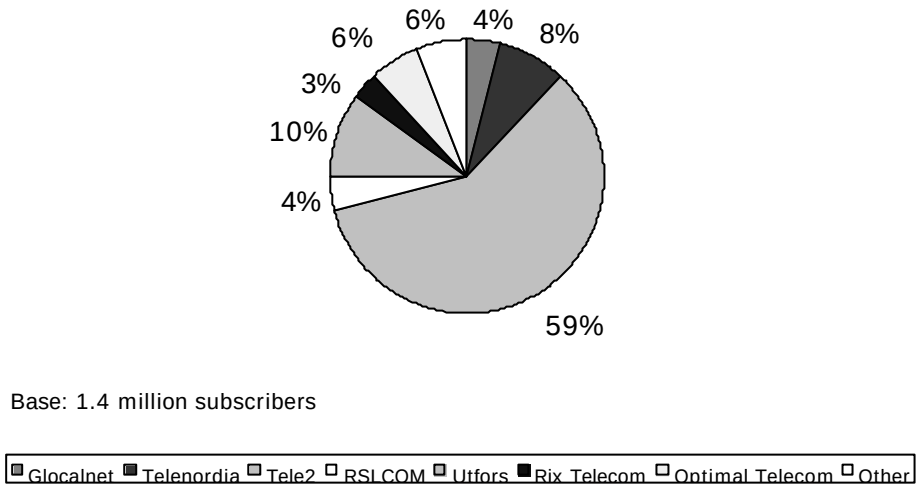


Diagram 10: **Distribution of indirectly connected subscribers**

Tele2 has 59% of the indirectly connected customers. The next largest is Utfors, with 10% of the subscribers and thereafter Telenordia with 8%.

3.4.1 ISDN[8]

At the end of 1999, there were approximately 645,000 ISDN channels, which is an increase of almost 70% during the year. These channels are distributed between 8% domestic and 92% business. The reason that ISDN has had such growth within the commercial market has partly been the result of subscriber switchboards being directly connected to the ISDN interface, and also that ISDN is used for Internet access. In the domestic market the number of ISDN channels sold has more than doubled during the year. The reason for this is that ISDN is in demand as access for the Internet, and thus not for telephony services. During 1999, Telia conducted several campaigns relating to ISDN comprising subsidised installation charges and customer-placed equipment, e.g., routes, with Internet connection directed at both households and business.

[8] Integrated Services Digital Network

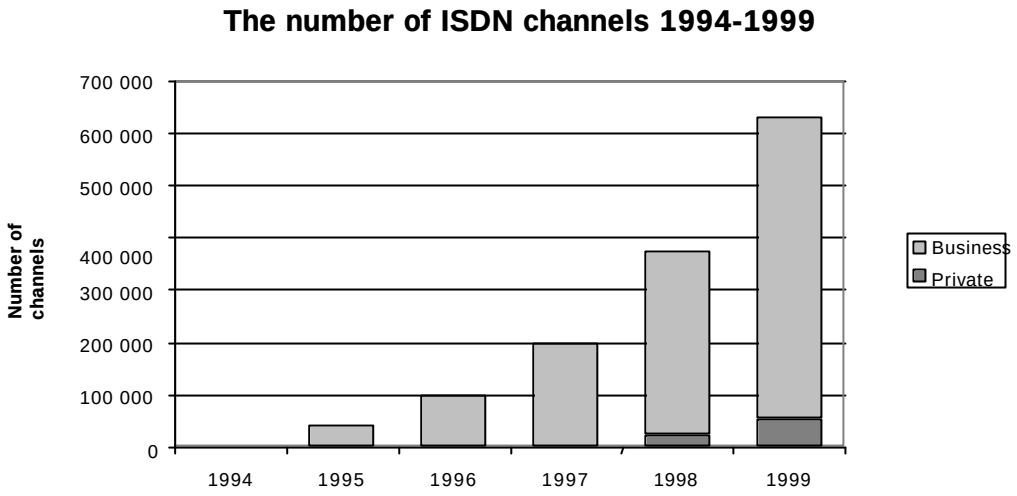


Diagram 11: **Number of ISDN channels, 1994 – 1999**

Telia is still the only telecom operator offering a public ISDN network in Sweden. Other telecom operators can provide ISDN when they offer customers direct connection to telephony or Internet services. Of the total number of ISDN channels, Telia has a market share of over 95%.

3.5 Services

The increase of customer stock for fixed telephony services has been attributed high priority on the part of telecom operators during the years that the market has been opening up for competition. Instead of investing in the production and launch of new services, great energy and expenses have been devoted to marketing activities such as direct advertising, telemarketing and television commercials. During 1999, there was particularly great activity as a result of the preselection reform, which was to enter into force on 11 September. This customer focus is also to be expected within traditional telephony when the telecom operators compete for a service that the majority of users consider to be a very simple service, i.e., difficulty in differentiating.

The new services that have been launched have been created with the purpose of simplifying matters for and supporting the customers, such as the customer service function on the Internet, voice control opportunities, statistical tools, etc. Furthermore, integrated messaging services have been launched.

In pace with competition increasing and becoming stiffer, the management of and proximity to existing customers and marketing to potential customers is of increasing importance. This has the effect that telecom operators devote great resources to functions such as sales organisation, invoicing systems, marketing,

customer services, etc. It is not only other telecom operators that comprise a threat to customer stock but also other parties within other sectors who view telecommunications services as a complement to their existing core operation. This is done both in order to obtain a closer relationship to their existing customers and to develop value-added services aimed at increasing revenues. The majority of customer support functions existing today demand resources, such as staff. In order to be able to reduce these costs over time, significant investments in self-service services are currently being made, among other things via the Internet. So far these services operate as supplements and involve, according to the telecom operators themselves, sometimes even higher loads than the manual customer services function.

3.5.1 Telephone cards

In the market for mobile telecommunications services, the development of pre-paid cards has facilitated the expansion of subscribers by a new customer group being reached. The majority of telecom operators have also launched pre-paid cards for fixed telephony services. However, the value of the market for pre-paid cards is marginal in relation to the total value for fixed telephony services, which means that telecom operators have either discontinued this effort or the service has only been a supplement to some other range of products. The primary reason that the market is not as large in Sweden is that 99% of households already have a subscription for fixed telephony, and also that a high proportion also have mobile telephones.

3.5.2 Directory enquiries

Competition in directory enquiry services is at present not satisfactory. According to the Telecommunications Act, telecom operators who are under a duty to notify shall provide information about their subscribers for the purpose of directory enquiries. However, there are several uncertainties concerning the form in which this information shall be provided, level of value added, transaction manner, pricing, etc. There are few telecom operators who today conduct directory enquiries in-house. Instead they purchase the service from someone else. There are basically two parties in the market for directory enquiries Telia Infomedia and Ahhaaa[9]. If the market is defined as calls to the 118 XXX series, which is the number series used for directory enquiry services, it is expected that it is worth approximately 800 MSEK. Telia is at present clearly dominant in this market.

In September 1999, the Government assigned PTS a task relating to the absence of a comprehensive directory catalogue function in Sweden. According to Article 6 of the Voice Telephony Directive, a directory and number information service for fixed and mobile subscribers was to be introduced in the respective Member Countries on 1 June 1998. This was not complied with in Sweden. This

[9] Has changed name, previously called Informationsmäklarna [Information Brokers]

investigation will be completed on 1 September this year. It is hoped that such a function will positively influence the development of competition in directory enquiry services.

3.5.3 IP telephony

IP[10] telephony received great attention as a concept in the market during 1997. IP telephony involves telephony with IP as the bearer. It differs from the current circuit-switched network for telephony services, PSTN[11], in that the information is transferred in the IP network in data packages which involves more efficient use of existing networks. A decisive reason for IP having such an impact is that the technology is used between the computers that comprise the Internet. The parties in the market are agreed that it is IP technology that will dominate in the future and a new infrastructure is being constructed on the basis of this fact. As regards the backbone network, IP technology is extensive and is used as a backbone technique for both voice and data. In the form of services to end users, IP technology primarily exists in the form of data and has not yet involved telephony services to any great extent. The reasons for this are, among other things, that quality is still inadequate and that access to a network adapted to telephony, PSTN, is already in existence.

The attention that the concept IP technology and broadband have received in the mass media has had the consequence that many customers, primarily in the commercial market, seek this technology. This occurs irrespective of whether the customers can see the advantages or customer benefit of IP-based services. For the majority of telecom operators, the services based on IP are in the process of development and to a large extent still at the test stage. Whether a customer is inclined to switch to a new technology depends on the form of existing communications services and thereby the need to change. If the expense is too great in relation to the value added gained by the customer, resulting from the change to new technology, the majority will opt to postpone any change.

3.6 Prices

The price for fixed telephony services comprises fixed charges, the opening charge together with the price for call minutes.

As regards price developments for fixed charges, i.e., subscription charges, installation charges, charges for moving of fixed subscriptions, etc., marginal changes have taken place. The main reason is that Telia is subject to a price ceiling relating to fixed charges, which means that Telia cannot increase prices during the year by more than the increase in the net price index for the preceding year. The existing price ceiling will apply until the end of the year 2000. The Government

[10] Internet Protocol
[11] Public Switched Telephone Network

may decide on either a possible extension, or an alteration of the price ceiling currently applicable.

Price has been, and is still, the primary means of competition for telecom operators. A service such as fixed telephony services is difficult to differentiate and therefore there are few opportunities for telecom operators to attract customers by anything other than low prices. Customer pressure for lower call prices was very severe during 1999, both in the commercial and domestic market. The consequence was that prices were subject to very hard pressure during the year and this development has also continued during the first half of 2000.

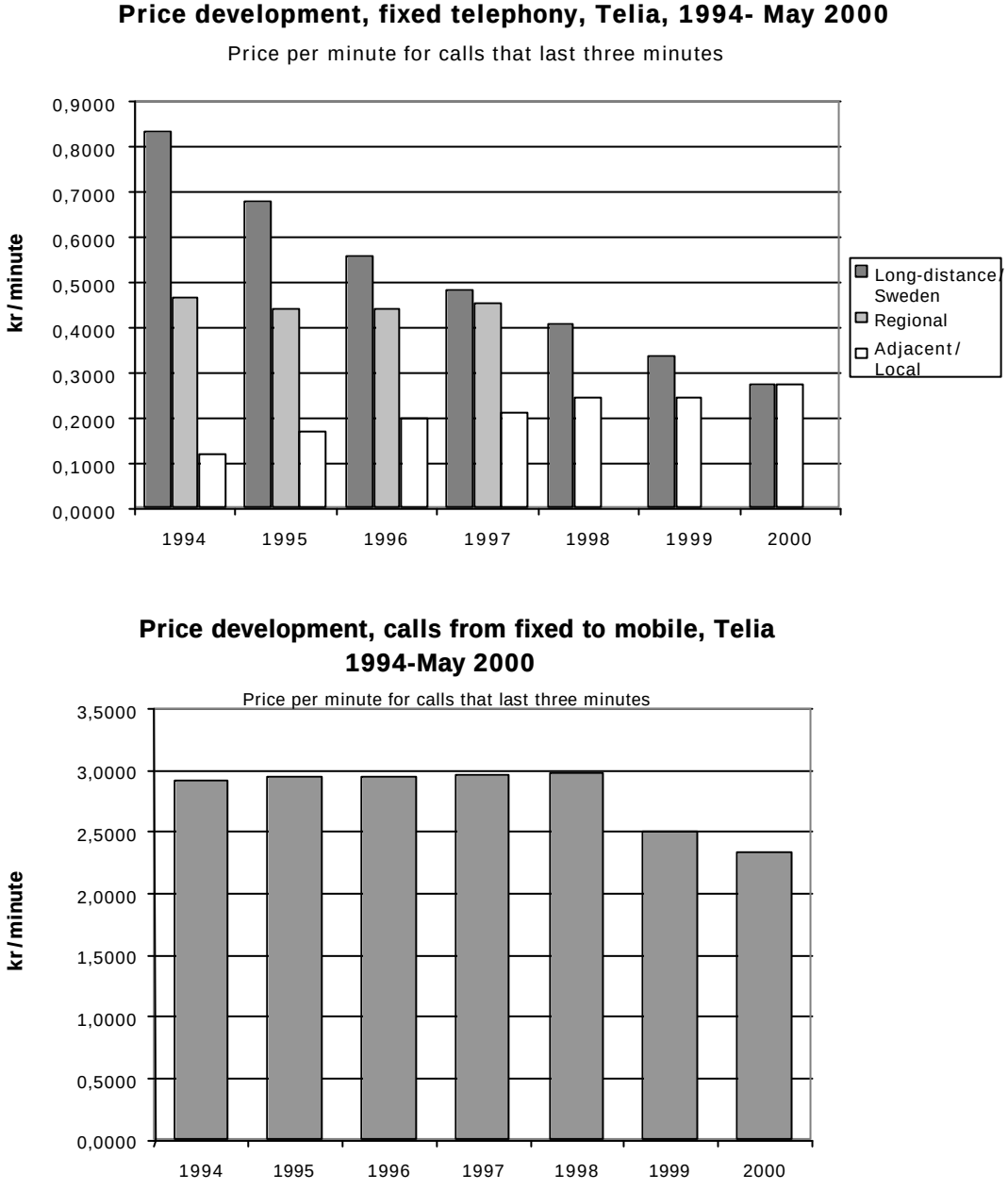


Diagram 12: **Price development, fixed telephony**

Diagram 12 illustrates the development of prices for fixed telephony services divided according to call types. The computation is made on the basis of Telia's prices. Call duration has been assumed to be three minutes, on the basis of which the minute price has been computed, including opening charge. The computation is conducted excluding value-added tax. The substantial price changes implemented at the beginning of 2000 have also been included in the above diagrams. The clearest development is that prices are becoming less dependent upon distance. Among other things, it may be mentioned that Telia removed the so-called regional call in November 1997, and during 1999 several companies started to introduce a uniform tariff for national calls. In February 2000, Telia introduced a uniform tariff for local and national calls and at present, largely speaking, all other telecom operators have followed suit. Current market development with a market that increases in value, more active parties and altered conditions of competition will involve further reductions in price. If production costs and interconnection fees are not reduced to the same extent, margins will reduce and telecom operators will need to supplement their range of products further.

Since 1994, the price per minute for a three-minute call within and outside one and the same area code number district has altered in the opposite direction. Compared with 1994, the price per minute for local calls has more than doubled. For a call outside the area code number district, the current price is only one-third of the price in 1994. Opening charges have also increased during the year. In 1994, the opening charge was 12 öre, excluding value added tax, and with the latest changes the opening charge is at present 38.3 öre.

Compared with previously, customers started to pay increasing attention to the price of calls to mobile during 1999. The price for this kind of call was for several years unchanged and first started to be reduced during 1998. The opportunity for price reduction was that some telecom operators could circumvent the high interconnection charges (2.75 kronor per minute) by directing the calls via abroad[12]. The call was thereby debited as a foreign call for which the cost was 30 öre per minute. Even if further expenses of 30 – 40 öre were added for other costs, great price reductions could be attained. This has still been very much disliked by the existing mobile telecom operators, who lost substantial interconnection revenues. However, for the telecom operators who used this means of direction there were greater margins on these calls, which meant that they also had scope to compete more severely for other kinds of traffic.

As a result of this, conflicts arose between the mobile telecom operators and several of the other telecom operators during 1998 and 1999, with mediation among other things as a consequence. On 1 October 1999, PTS expressed its views on hubbing via abroad of traffic to mobile telecommunications networks. PTS's view is that this does not conflict with the Telecommunications Act and that the mobile telecom operators should demand payment from the operator

[12] So-called "hubbing" or "tromboning"

who last directed the traffic into their network, i.e. not from the operator where the call originated. Ordinarily, it is from Telia's fixed network that the call is directed into the mobile telecom operator's network.

A further factor which contributed to reduced prices for calls from fixed to mobiles was that PTS directed Telia to reduce interconnection charges by 20% on 15 May 1999. As of this date, both Telia and Tele2 reduced the price for this kind of call by up to 20%. The background to the direction was that PTS, in July 1998, considered that Telia had a significant market influence on interconnection in Sweden. Telia was thereby subject to the obligation to have interconnection charges based on costs even for calls in the mobile network.

After further scrutinisation of the basis for the computation, Telia was directed on 31 May this year to reduce interconnection charges further as of 1 July 2000, to 1.13 kronor per minute on average. Telia has appealed against the decision to the County Administrative Court.

The majority of the existing telecom operators have the business concept of being a price leader, or in any case to be viewed as such. The difficulty concerning price control for a consumer is increasing in pace with the number of parties with various price plans increasing, prices being changed often and services being integrated or overlapping with each other. To aid consumers, there have in recent years been a number of price comparisons published in, among other things, newspapers and journals, on the Internet, etc., by which a consumer can describe his call behaviour and on the basis of this obtain recommendations for telecom operators that have appropriate pricing. It is also worth mentioning that PTS intends to develop a consumer-orientated service for price comparison during the autumn of 2000.

It is stated in the Telecommunications Act that telephony services should be provided at reasonable prices, the assessment of which should be conducted on the basis of the consumer's perspective. To date, the price of telephony services has been the same irrespective of where in the country the consumer is located. However, the requirement for reasonable prices means that it should be possible to allow some geographical variations in tariffs. However, tariff reductions in some regions should not be compensated for by increases in other regions. Geographical price variations are something that none of the existing telecom operators have yet chosen to use.

Viewed historically, the telephone number has provided the user with information about the type of service and the level of cost for the respective call. However, new areas of applications and services, including the price, will in time be less related to the telephone number. To control the price for a call on the basis of the telephone number will thus be very difficult.

Tests and investigations are being conducted by telecom operators into whether pricing of the traditional telecom services in PSTN may be altered. Opinions are divided as to how telephony services will be priced in the future. Some believe

that telephony services will largely become free over time and that they will be packaged with other services at no extra charge. At present, tests into how the market reacts and its interest in telephony services at a fixed price, among other things, are being conducted by Glocalnet in collaboration with Bredbandsbolaget. In order that it may be possible to offer such pricing it is necessary that the traffic volumes do not go sky-high, as telephone operators will still be forced to pay interconnection charges to other telecom operators. This is the reason that the other parties consider that the existing price structure will prevail for a rather long time in the future. This is a price structure that is used internationally and great changes and many contract negotiations will be needed before alterations to the pricing can be made for the customer.

The current price per minute is to a large extent governed by the charge that Telia imposes for transporting a call to/from some other operator to/from/through its own network, i.e., the interconnection charge. As Telia has significant influence on the telecommunications market, Telia's interconnection charges should be based on costs according to the Telecommunications Act. A schedule is given below of Telia's interconnection charges relating to Termination and Access Services. The charges are based on traffic within a single segment[13].

Year	Price per call	Ordinary week-days 08.00-18.00	Other times
1994		27,0 öre	27,0 öre
1995		23,5 öre	23,5 öre
1996		27,6 öre	13,8 öre
1997	7,0 öre	16,0 öre	8,0 öre
1998	7,0 öre	12,6 öre	6,3 öre
1999	4,9 öre	8,9 öre	5,6 öre
2000	4,8 öre	6,8 öre	5,1 öre

Diagram 13: **Price development for the interconnection charges**

The interconnection charges vary, as does the final-customer price, with prices per minute, time-of-day variations and opening charges.

Indirect connection is the most common form of connection of subscription for fixed telephony when some telecom operator other than Telia is engaged. Because of this form of connection being based on interconnection with other networks, primarily Telia's, the interconnection charge has had a major influence on how competitive a telecom operator can be. If the price in the market reduces at a greater rate than the interconnection charges, the margins of the telecom operators also reduce.

[13] Single segment means a call that is retained within a interconnection area, Telia's national network is divided into a total of 13 interconnection areas.

Interconnection charges are computed on the basis of computation models produced in advance. The model includes capital cost interest as a significant element in the determination of what is a cost-based pricing for interconnection charges. This capital cost interest has remained unchanged for several years and PTS intends to evaluate during the autumn of 2000 whether this level is acceptable on the basis of the Telecommunications Act's provisions and prevailing market conditions.

The majority of traffic within Sweden goes via Telia's networks, and Telia thereby obtains a large proportion of the interconnection revenues. This means that if Telia loses customers and associated traffic sales, it receives instead increased revenues from interconnection. Even if the revenue per minute is not as high for interconnection as for traffic sales to end users, the revenue loss for Telia is nevertheless proportionately low compared with other telecom operators. In pace with more subscribers engaging other telecom operators and increasing traffic volume, the market for interconnection also increases in value.

3.7 Market situation

Since the market opened up to competition during the autumn of 1993, it has primarily been the business market that has been the subject of market efforts by telecom operators. Initially, Telia's competitors made efforts to get companies to directly connect into their own networks in order to thereby be responsible for the customer's complete telephony services. Whether it is profitable for a customer to connect directly or not is influenced by several factors such as the distribution of the customer's ingoing and outgoing traffic volume, distribution of call types, geographical location, distance to the telecom operator's local exchange and the duration of the contract. Of course, competition for direct connection is hardest in the urban areas where a great proportion of business customers are located.

The most sought after, and thereby the most rigorously targeted customers are of course those customers who are most communications intensive. In order to reach these, telecom operators have to a great extent chosen to orientate their offers according to company size. However, communications intensity is not only governed by the size of the company but also by what type of operation the company carries out. This means that small businesses, on the basis of number of employees, can nevertheless be very large on the basis of communications volume. Examples of communications-intensive types of business include IT companies, the banking and finance sector, the travel industry, sales activities, transport and certain segments of the consultancy sector.

Through the opportunity of indirect connection of customers, the target group for telecom operators was extended. Up to and including 1997, it was primarily international traffic that the alternative telecom operators could compete for, then came calls outside the customers' own area code together with calls to mobile telephones, and during 1998/1999 even calls within the customers' own area code

districts were included. To a large extent, indirect connection is based on interconnection with other networks, primarily Telia's network, and thus interconnection charges influence the profitability of telecom operators. A further factor which has impeded stiffer competition has been that the customer stock has been resistant to selecting a telecom operator other than Telia, as Telia was the only alternative for a very long period. To overcome such resistance has required large expense in market targeting. Furthermore, alternative operators were reached by the customer needing to dial a special prefix before the number, something that was no longer required with the introduction of preselection. The decreasing interconnection charge, greater awareness by consumers and the preselection reform have thus had a positive effect on competition in relation to smaller businesses and private people.

Even if indirect connection today is offered to everyone, irrespective of where they are located in Sweden, there are factors that are of influence for this not being the case in reality. The majority of telecom operators have their head and sales offices located in urban areas which influences the awareness of consumers. Telecom operators segment the market and direct their activities to the areas where the customer base is comparatively large.

Viewed generally, it can be observed that those telecom operators that at present are largest in the telecom market, on the basis of revenues, are those that established themselves in the market early and who offer services directed towards the business market. Furthermore, they are also suppliers of comprehensive services and communications solutions and thereby offer other services in addition to fixed telephony. This does not thereby mean that the current smaller telecom operators orientated towards the private market cannot develop positively. The number of operators who offer fixed telephony services to the private market has also increased greatly in the last year. On a measurement conducted by PTS in May 1999, 12 companies stated that they offered fixed telephony services to the private market, which can be compared with 23 companies at present.

There is an increasing realisation on the part of customers about alternatives in the market. They thereby also impose greater demands on the parties that are active. The majority of customers still focus on the price, and primarily the price of traffic. In pace with increasing numbers of individuals communicating more and in different ways, other values are also of great importance, such as value-added services, quality, service, trademarks, comprehensive offers, etc.

Those telecom operators now entering the market ordinarily start on a small scale, with the lowest investment level possible. They have usually commenced as distributors for one of the established telecom operators with their own infrastructure such as Telia, MCI Worldcom, Telenordia and others. By operating as distributors, they do not need to acquire themselves any telecom equipment, sign interconnection contracts, acquire a network prefix, etc. When the customer base grows and their organisation becomes larger, service suppliers wish to have more control, for which reason they leave the distributor role and acquire their

own prefix and network exchange. Investment costs for an exchange depend on how many customers the telecom operator will connect. An exchange that will directly connect 2,000 customers costs approximately 5 MSEK. A corresponding network exchange that is used for indirect connection costs approximately 4 MSEK.

Of those telecom operators who offer telephony services today, there are only a few who can report profits. The general view of these operators is that they must obtain a greater share of what the respective customer consumes and that the Swedish population increase increases communication. With declining margins on services, it is even more important to increase volumes. The proportion who uses both fixed and mobile telephony and also the Internet is growing and the natural development for existing telecom operators is that they expand their market to include other communications services such as the Internet and mobile telecommunications services. This is becoming even more important with time as customers demand a single supplier for all telecom services to a greater extent. The desire for one supplier has been clear in the commercial market during recent years, but it is also manifesting itself in the private market. In order to satisfy the desires of the consumer and survive the stiff competition, the need increases for the majority of telecom operators to extend the range of services and become comprehensive service suppliers. If they have more services in their portfolio, they can also target the customers from different directions, i.e. existing customers on the Internet may be offered fixed telephony and vice versa.

3.8 Legislation

During the autumn of 1999, two important changes were made in the market preconditions for fixed telephony services by the introduction of number portability and preselection in Sweden. The intention is to achieve an improved situation for competition between new telecom operators as regards the former monopolistic enterprises by facilitating the choice of other operators for companies and private people. These two changes are oriented towards different kinds of customer: number portability towards directly connected customers, which primarily benefits larger companies, as regards traffic volume; and preselection towards indirectly connected customers and thereby towards small enterprises and private people. The change that has so far had the greatest impact on the Swedish market is the preselection reform, which is not unexpected in view of the Swedish market to a large extent comprising small enterprises and private people.

3.8.1 Preselection

The introduction of preselection on 11 September 1999, at the same time as the international prefix 00, was a major change in the Swedish telecom market. As of the introduction of preselection, a customer does not need to dial a prefix in order to reach a chosen telecom operator's network. As the prefix is not always used for

all calls, telecom operators lost a substantial part of customers' total traffic volume. As it is now possible for a telecom operator to be chosen in advance, the chosen operator receives a greater proportion of the respective customer's traffic. All kinds of calls are subject to preselection but a problem is, however, that the area code must also be dialled for a call within one's own area code district in order to use the preselection. If the area code is not dialled, the call goes via Telia's network. This is behaviour that customers are not used to and therefore the preselected telecom operators still lose a large part of this kind of traffic. Note that calls within one's own area number are also the kind of call that comprises the most turnover in the market for fixed telephony services. Telecom operators consider this to be a great problem, first because of a distorted competition situation, second because they still must expend large sums on targeting and reminding the customers. Furthermore, far from all customers have realised that they still need to have a relationship with Telia, and react by thinking that it is the preselected telecom operator that has not dealt with the customer properly when a bill comes from Telia. The reason why it is not possible to resolve the problem with local calls in conjunction with preselection was technical limitations in the AXE stations. However, telecom operators consider that this is one of the measures that should be given highest priority among future measures. This is an issue that is being afforded priority within PTS and, according to the current time schedule, regulations will be produced by the turn of the year 2000/2001. These regulations will in turn include a date for implementation.

As can be seen from previous descriptions of the development of the market, the competition situation has improved during 1999, with the preselection reform having had a positive effect. The direct advantages were that operators have obtained/are obtaining greater traffic volumes from existing customers. The indirect advantages have been the increased awareness on the part of the public who in turn added to new customers for alternative telecom operators. By installing telecom directional equipment with certain indirectly connected customers, existing telecom operators have already prior to the preselection reform reduced the problem of traffic losses. Such equipment for indirectly connected commercial customers costs approximately 1,000 kronor per customer, which means that such equipment is not installed by small enterprises. The increase of traffic volume as a consequence of preselection will thus primarily be from the private market and small enterprises.

In November 1999, the survey company Demoskop conducted an investigation on behalf of PTS relating to the preselection reform. Of the households questioned, 91% had seen, read or heard about the introduction of preselection in September. Just more than 40% of the households had chosen telecom companies by that date, of which half had chosen Telia. The primary reason for households not choosing a telecom company was that they considered themselves satisfied with the telecom company they have.[14] When preselection was introduced in September 1999, the effects had only comprised four months

[14] See www.pts.se for more detailed information about this investigation

during 1999 and the earliest that it will be possible to determine the real effect that this has had on the competition situation will be the follow-up in 2000.

As already mentioned, preselection was to facilitate the opportunity to select telecom operators. However, the introduction has had the unexpected effect of certain customers having instead transferred responsibility for preselection to a company. This company thus acts as a distributor of telecom services and has full freedom to choose, on behalf of the customer, one or two telecom operators as preselection. There is thus a new kind of telecom party who offers a complete service, prices it and attends to customer contact, but which in turn collaborates with one or more telecom operators and purchases telecom services from them.

When asked what was the most positive and most negative event respectively in the telecom market during 1999, preselection is named in both cases. The positive factor is, as already mentioned, that the competition situation improved firstly among existing telecom operators and secondly that increased traffic volume per customer attracted new parties to the market. That preselection is considered to be the most negative event is primarily related to subscribers not being compelled to make an active choice, which in its turn resulted in conflicts between telecom operators concerning the definition of who the customer belonged to, connection criteria and the level of charges between telecom operators. Telecom operators feel that these problems had a negative indirect effect on the interest in changing telecom operators at all. The general view is that the majority of those problems that arose would have been avoided if every subscriber had been obliged to make an active choice.

PTS's view is also that the implementation of the preselection reform was far from problem-free. Problems have arisen between various telecom companies, between telecom companies and their customers and also between telecom companies and PTS. Set against this background, PTS has allowed the company Temaplan to conduct an evaluation of the preselection reform. An important cause of certain problems being aggravated was the law applicable to preselection not entering into force before 1 July 1999, i.e., two months before implementation, which limited PTS's opportunities to take action before this date.

As mentioned, preselection involved certain costs for telecom operators. According to the Telecommunications Act, telecom operators are only entitled to base the charges they impose on each other on costs referable to operational expenses, i.e. not investment costs, in order to make a preselection technically viable. In practice, this rule affects only Telia. The charge was during 1999 35 kronor for the preselection order comprising either national or international calls and for both kinds of call 67 kronor. PTS directed a reduction of the charges in May 2000 to 9.25 kronor for either national or international calls and to 15.20 kronor for both international and national calls. Telia appealed against the direction to the County Administrative Court on 9 June this year.

3.8.2 Number portability

During the autumn of 1999, it became possible for a subscriber to fixed telephony to retain his/her telephone number on changing to the telecom operator to which the subscriber is directly connected, provided the customer is within one and the same area code district[15]. Number portability was also possible when the entire 1 000 and 10 000 number series could be moved between operators, following a decision by PTS.

As private people and businesses are to a large extent currently directly connected to Telia, number portability (NP) applies to a proportionately small section of the market as regards number of customers. It is estimated that there are approximately 4,000 customers who are directly connected to some telecom operator other than Telia.

At present, approximately 600 numbers have been ported. In this context 'number' refers to directory number; it is therefore probable that the number of customers who chose to port the number is less than 600 as in some cases a single business has more than one number published in the telephone directory.

NP has not had the effect on the market that was expected. The explanation is, according to telecom operators, that NP was introduced into the Swedish market from a technical and legal perspective, but not a market perspective. A telecom operator who transfers a number is entitled to payment for operational costs for the transfer and also for increased traffic costs. However, as in the majority of countries where NP has been introduced, telecom operators have found it difficult to agree on the financial terms, and it was only when the responsible national authority examined and altered the level of charges that some effect was achieved. PTS is currently working on a proposal concerning statutory amendments relating to the principles for payment in relation to NP. According to Telia's price list for number portability it costs currently between 730 – 1,340 kronor per number as a one-off charge; in addition there are redirection charges of 0.11 kronor per call for traffic to geographic numbers or 0.05 kronor per call for traffic to freephone numbers.

It will only be in connection with the growth of the target group for direct connection that NP will have any decisive importance for the competition situation for fixed telephony services in Sweden. Telecom operators consider that it should be possible to improve opportunities for the direct connection of customers to the telecommunications network and measures to promote such development, such as, access to the local loop, i.e. LLUB, should be given high priority.

[15] Number portability has previously been possible if a customer moved within the same local station area.

3.8.3 Premium rate calls

The market for premium rate calls still constitutes a problem in the telecommunications market, as it is largely only Telia that can provide the service. However, other telecom operators consider that it is a very interesting market to be able to enter and that the preconditions should be altered. The problems existing in the market concern the routines relating to invoicing of customers and were already observed during 1996. However, on 1 July 1997, the preconditions for premium rate services were altered by it being clarified that the interconnection obligations also comprise deduction in invoicing. However, telecom operators have not pursued the issue particularly actively and PTS has not had any matters raised externally. PTS has to date therefore not considered there to be any reason to afford priority to this issue.

In the market study relating to 1996, the analysis company Stelacon estimated the market to be approximately 300 MSEK. Unfortunately, no information concerning the size of this market could be obtained, but there is nothing to suggest that the value may have decreased during the last three years. As the market for premium rate calls for “adult content” is starting to accelerate again the signs are rather that the market is growing instead of declining.

4. Mobile telephony

The market for mobile telecommunications services continues to develop positively. During 1999, both the value and number of subscribers on the market have developed at approximately the same pace as previously. The GSM technique is still primarily used for voice transfer.

4.1 Parties

In April this year, there were four undertakings who had licences under the Telecommunications Act to provide mobile telecommunications services, which is a reduction of one undertaking in the last year.

The following undertakings currently have licences to provide mobile telecommunications services:

- Telia AB (NMT 450/900, GSM 900/1800, TFTS, ERMES)
- Europolitan AB (GSM 900/1800[16])
- Tele2 AB (GSM 900/1800[17])
- Tele Danmark International AB[18] (ERMES)

It is worth noting that Tele8 Kontakt AB, owned by the telecom operator Telenordia AB, previously had a licence to provide mobile telecommunications services based on GSM technology in the frequency band 1800 MHz. After an investigation at the turn of the year 1999/2000, PTS has withdrawn Telenordia's licence as no activities to utilise the frequency had yet commenced. Besides PTS revoking this licence, Tele2 AB, on its own initiative, has withdrawn its licence for mobile telecommunications services in the analogue network (NMT 900) as it does not currently offer such services.

In the description of the market for mobile telephony, we have concentrated on the parties that provide services based on NMT (450/900) and GSM (900/1800). Activities such as aviation telephony and paging have thus been excluded. In the Swedish market these services are only provided by Telia and the market's size is marginal in relation to the total value of the market for mobile telecommunications services.

The telecom operators that hold licences to provide mobile telecommunications services also own the infrastructure on which they base their services. They thus act both as service suppliers and network owners. However, in recent times several new undertakings that provide mobile telecommunications services have

[16] Licence held by Europolitan PCN AB
[17] Licence held by NetCom AB
[18] According to information, Tele Danmark plans to request that the licence for ERMES is revoked

been created. These undertakings do not have any network resources but utilise the networks of others and sell services by:

1. acting as a service provider and thereby selling services as distributors for existing network owners; examples of distributors are Tele1 Europe and Sense Communications

2. offering services by 020 numbers. The customer obtains a freephone number which goes to the service supplier's exchange. The customer is identified by a personal code and a tone obtained; examples of such companies are Telenordia, Telerian,

3. connecting calls via abroad and back to Sweden again: so-called 'call-back'. These companies utilise the fact that it is less expensive to make a call from some other country than to call within Sweden.

4.1.1 Service provider

As of 1 May 2000, owners of mobile network capacity, i.e., Telia, Europolitan and Tele2/Comviq, are obliged to sell excess capacity to those demanding this. This sale is to be conducted on fair market terms which means that the price should be a fair market price. The intention of this Act is to increase the market for mobile telecommunications services for undertakings that do not have their own network resources, service provider (SP), and thereby increase the number of parties attaining a market that is characterised by stiffer competition than previously. So far, this Act has not been applied. Set against the background of the interviews conducted, the parties consider that commercial contracts are preferable to utilisation of the new Act.

During 1999, there were two service providers in Sweden: Tele1 Europe and Wireless Maingate. During April 2000, Sense Communications AB has also been included. Interest in being able to act as a service provider within mobile telecommunications is great, particularly from telecom operators who today are only capable of offering fixed telecom services. In order to be able to expand its operation, it is required that a fixed network operator also has access to mobile telecommunications services. The reasons for this are several: customers buy telephony irrespective of whether it is mobile or fixed; commercial customers wish to buy telecommunication from one and the same operator; competition is becoming stiffer and it is therefore necessary to have greater opportunities for various customer-adapted solutions, for example, package solutions, and also an increasing proportion of customers wish only to have mobile telephony.

Even if the market for SP in Sweden may appear to be very promising, an SP is faced with several obstacles that the operators with their own networks do not encounter. Among other things, the three network owners today already control the entire route to the customer and thereby have an organisation adapted for this, i.e., customer services, distribution channels, invoicing systems, etc. What

opportunity an SP has to be competitive is of course dependent on how the contract between the SP and the network owner is structured. It is probable that the network owner will do profitable business which probably means that the SP has higher costs for traffic sales than the network owner itself. As the primary means of competition in the end user market is at present the price, the scope for achieving positive margins for an SP that is only orientated towards mobile telecommunications services is consequently limited.

However, it has been shown that there is interest on the part of mobile telecom operators with their own network to sell network capacity to other parties. Firstly, telecom operators state that discussions with mobile telecom operators on commercial solutions are being conducted; second mobile telecom operators are themselves becoming aware that the market is developing towards a more vertical division than at present.

4.2 Market volume

Up to 1998, there were only three mobile telecom operators in the market in Sweden, which altered during 1999 when, among others, Tele1 Europe was included. However, as Telia's, Europolitan's and Tele2/Comviq's activities still comprise the dominant part of the market, we have limited ourselves to presenting the market position from the perspective of their activities. We have not included Tele1 Europe's activities in the mobile market in Sweden in the following volume description as the scope of the operation is to date marginal compared with the three other mobile telecom operators.

The Swedish market for mobile telecommunications services continued to increase during 1999. The total number of subscriptions amounted to just over 5.1 million subscriptions, which is an increase of approximately 1 million subscriptions during the last year. The rate of increase amounted to approximately 25%, i.e., somewhat less than during 1998 when the rate of increase was 30%.

Number of subscriptions of mobile telecommunications services 1994-1999

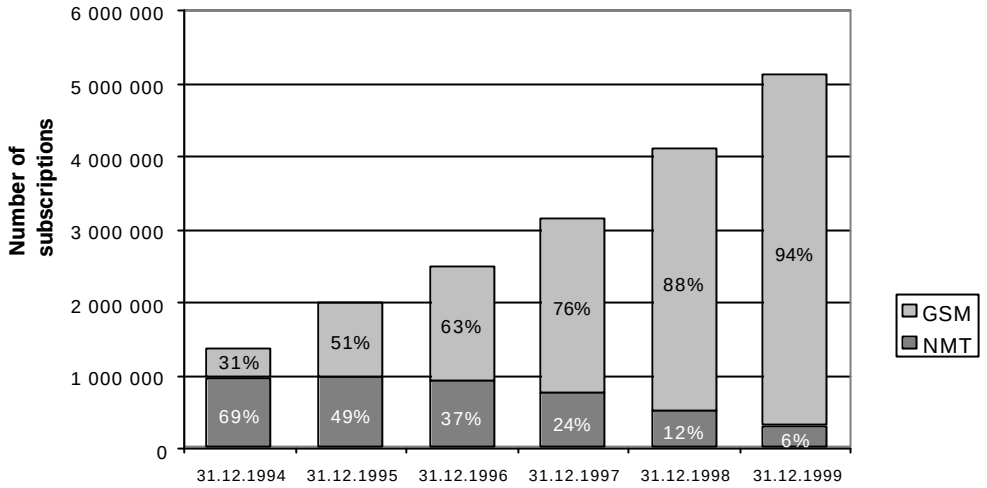


Diagram 14: **Number of subscriptions to mobile telecommunications services 1994 – 1999, GSM and NMT**

If the number of subscriptions is related to the Swedish population, Sweden had a penetration level of approximately 57%, including pre-paid cards, at the end of 1999. This has increased further during the first quarter, when the number of subscriptions amounted to almost 5.4 million subscriptions, i.e., a penetration level of approximately 60%. However, according to several market surveys conducted by various investigation companies, it has been shown that a person may have several subscriptions, and also subscriptions that are not used. This is also confirmed by the mobile telecom operators. This is particularly usual with pre-paid card subscriptions where some subscribers choose to take out a new subscription instead of topping up their old one. According to information received, it is more reasonable to assume that the number of active subscribers in Sweden do not exceed 4.5 million individuals, which would correspond to a penetration level of approximately 50%. The level of penetration also differs between various subscriber groups. The newly established subscribers comprise to a large extent young people and old people.

The number of subscriptions based on NMT comprise a decreasing proportion of the number of subscriptions. At the turn of the year this proportion was almost 6%, which corresponds to approximately 290,000 subscriptions. Of these subscriptions, approximately 130,000 are NMT 900 and approximately 160,000 NMT 450. During 1998, Telia decided that NMT 900 will be phased out and stopped by December 2000.

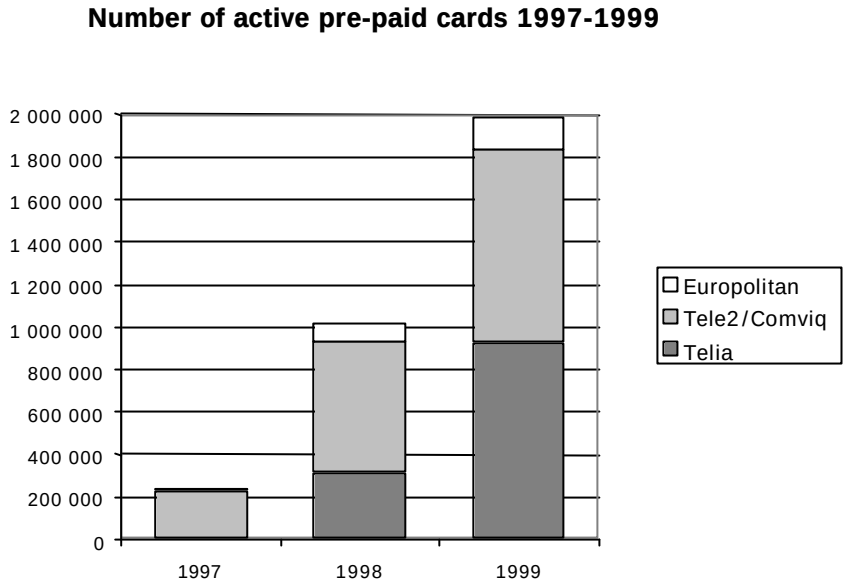


Diagram 15: **Development of the number of active pre-paid cards**

At the turn of the year the number of activated pre-paid cards was almost 2 million. Of the total number of subscriptions, pre-paid cards thereby comprise approximately 39%. At the end of the first quarter of 2000, the number of activated pre-paid cards had increased by almost 200,000.

The total turnover for mobile telecommunications services amounted during 1999 to approximately 17,700 MSEK, including interconnection revenue. If revenues that the operators obtained from utilising each others' networks are excluded, the market had a turnover of 12,700 MSEK during 1999. Revenues from interconnection charges thus comprise 28% of the total revenues of the mobile telecom operators. The market grew in value by 18% during 1999 compared with 1998, i.e., somewhat less than the growth in 1998 when growth amounted to approximately 24%.

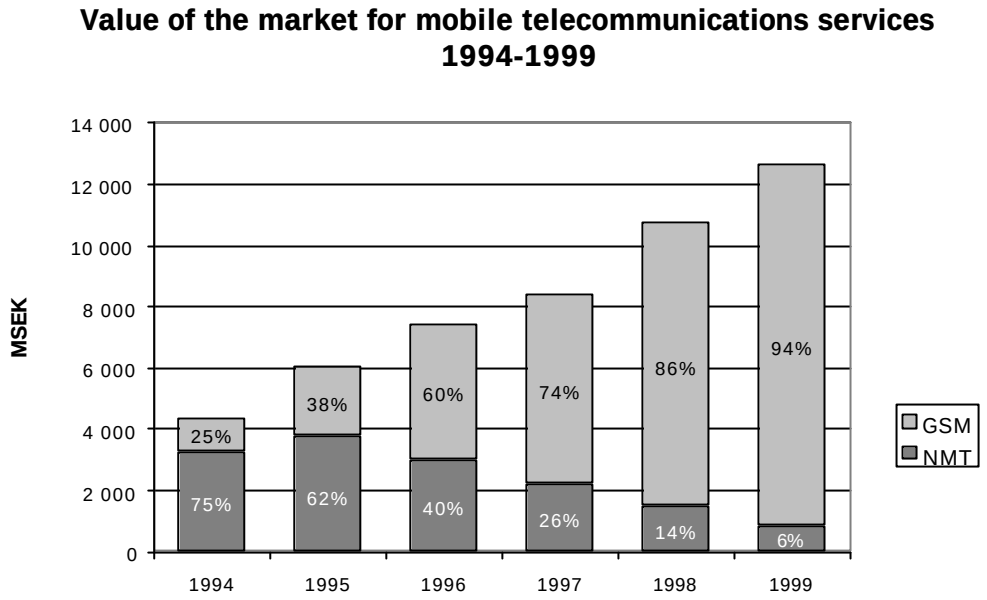


Diagram 16: **The market for mobile telecommunications services 1994 – 1999, GSM and NMT. Excluding interconnection revenues and traffic sales to other telecom operators.**

The distribution between the commercial and private markets was approximately 55% and 45% respectively. This distribution is made on the basis of who pays the subscription and not what kind of subscription has been taken out.

During the last three years the number of subscriptions has increased more than the revenues, which means that the average revenue per customer is falling. The primary reason for this is that the new subscribers added during recent years do not call as much as the "older" subscribers, which consequently reduces the average.

4.3 Market shares

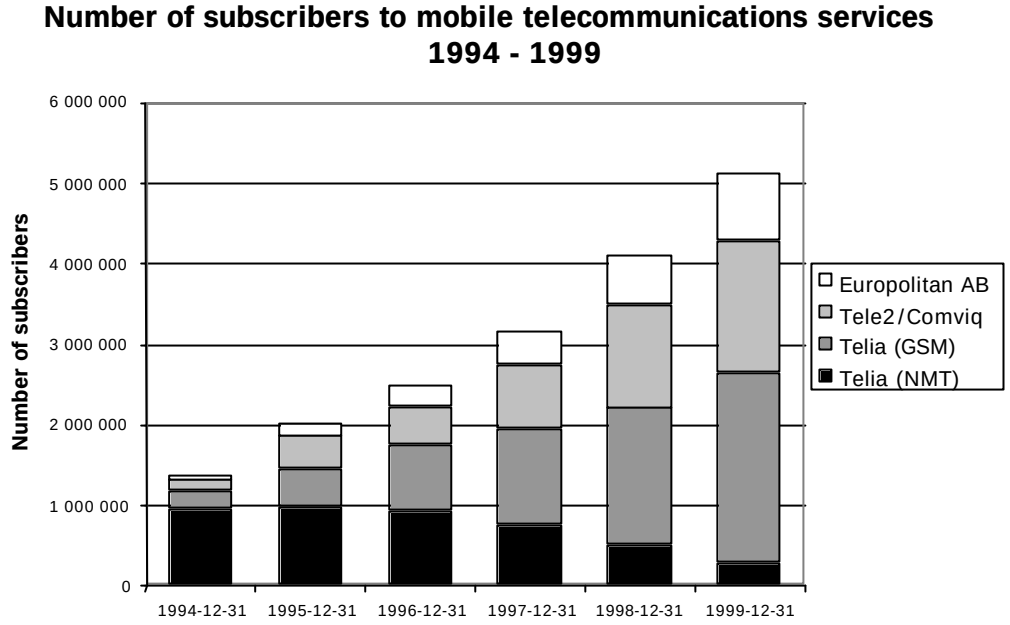


Diagram 17: **Shares of number of subscribers, mobile telecommunications services 1994 – 1999, GSM and NMT**

On the basis of the number of subscribers, Telia Mobile is still the operator that has the greatest share. If subscriptions to both GSM and NMT (450 and 900) are included, Telia's subscribers totalled just more than 2.6 million at the turn of the year 1999/2000. This corresponds to a share of 51.5%, which may be compared with a share of 53% during 1998. The next largest on the market is Tele2/Comviq, whose numbers amounted to just more than 1.6 million subscribers at the turn of the year. Their share of the number of subscribers has thus increased by one percentage point during the last year, from 31% to 32%. The corresponding share of subscribers for Europolitan was just over 0.8 million subscriptions, which corresponds with a share of 16.5% for 1999 compared with 15% during 1998. If developments are compared over recent years, there has not been a very great change in the distribution of the number of subscriptions between the three mobile telecom operators.

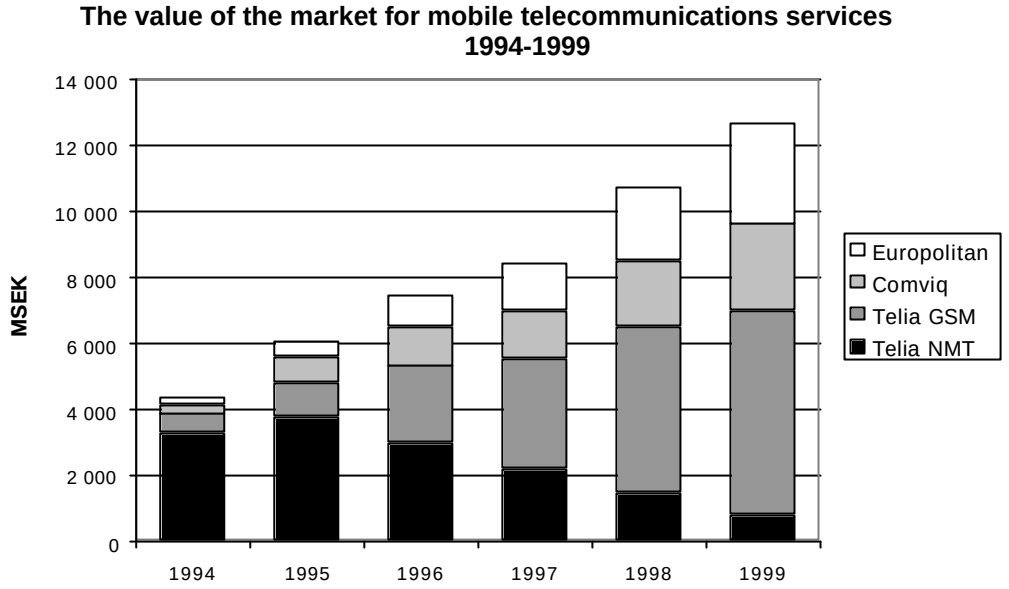


Diagram 18: **Market shares, mobile telecommunications services 1994 – 1999, GSM and NMT. Excluding interconnection revenues and traffic sales to other telecom operators.**

The operators' shares of the turnover of the mobile telecommunications market differs from the distribution of the number of subscriptions. Telia is the largest operator with a turnover of approximately 700 MSEK. This corresponds to a market share of approximately 55% and Telia has thus lost five percentage points to the other operators during 1999. The next largest is Europolitan that has a share of 24%, which corresponds to a value of 3,100 MSEK. Europolitan has thus increased its market share by three percentage points during 1999, while Tele2/Comviq increased their share from 20% to 22% (approximately 2,600 MSEK).

On comparing the average revenue per customer of the mobile telecom operators we can observe that Europolitan has the highest value, followed by Telia and Tele2/Comviq have the lowest. This is a consequence of the strategy and market focus that the three operators have, where Telia orientates itself towards the entire market, Europolitan towards customers with relatively high traffic volumes and Tele2/Comviq, first and foremost, towards the private market.

4.4 Services

The mobile network is still primarily used for speech and only to a limited extent for data communication. According to information received, traffic that is not speech comprises only 5% of all traffic. With the current limitations of quality and technology, the opportunities for telecom operators to develop more advanced service are small. A large alteration on the service side is the increased use of

SMS[19]. This is not a new service on the market, but should nevertheless be mentioned as it is the customers themselves who have pushed development of the service. The use of SMS has increased markedly during 1999, when the number of short messages sent from mobile telephones amounted to approximately 150 million. This number is rather low compared with our Nordic countries who on average send three to four times as many. For example, it may be mentioned that, in Finland, 650 million SMS-messages were sent during 1999. A decisive factor has been that the pricing of SMS services has been significantly more expensive in Sweden than in the other Nordic countries. Young people are primarily responsible for this growth, which is rather price-sensitive. WAP[20] telephones started to be sold and used in Sweden during 1999, although still on a very small scale. This also contributed to new services such as the possibility of sending fax and e-mail from mobile telephones, information services, Internet accesses, and e-mail addresses linked to the subscription.

In the current circuit-switched GSM-based network (900 MHz and 1800 MHz) there are limited opportunities for operators to develop and offer more advanced services than voice telephony and also simple data communications services such as SMS. This is primarily due to the speed obtained only amounting to 9.6 kbit/s. However, the GMS network is currently being upgraded.

Two of the operators, Europolitan and Telia Mobile, have upgraded the network to the technology HSCSD[21] which provides a speed increase to 14.4 kbit/s per channel. The respective customer can gain access to three channels at the same time which facilitates a speed of 43.2 kbit/s. Commercial services started to be offered to customers during the spring of 2000 and were used primarily for rapid Internet connection by commercial customers.

Forms of subscription

All mobile telecom operators introduced new forms of subscription during 1999. At present there are some 20 different subscriptions to choose from. The most manifest differences in the new subscription were that the minimum contract terms were reduced, and in some cases, completely removed, and also that there was a noticeable reduction of the price per minute primarily during the evening. Even if mobile telecom operators try to profile themselves differently and vary the range of subscriptions, we can nevertheless observe that the options available, pricing and structure resemble each other to a very great extent.

[19] Short Message Services
[20] Wireless Application Protocol
[21] High Speed Circuit Switched Data

4.5 Prices

The price for mobile telecommunications services comprises any subscription charges, the starting charge for the call together with the price for call minutes.

Up to and including the first half-year of 1999, the price levels for various forms of subscriptions were largely unchanged. There was rather a variation between the price structure of the various forms of subscription than a general price reduction. During the second half-year of 1999 and up to the present, mobile telecom operators have initiated a downwards trend in pricing. The price changes that were implemented up to and including the second half-year took place in conjunction with the new forms of subscription being launched, which were primarily directed at private customers with lower prices per minute for those times during the day when these customers mostly make calls, i.e., in the evening. However, there is now a tendency towards both lower monthly and minute charges, for both new and existing subscriptions. However, at the same time as these reductions were introduced, the opening charges of some operators and for certain subscriptions, together with changes to the definition of low and peak traffic were changed.

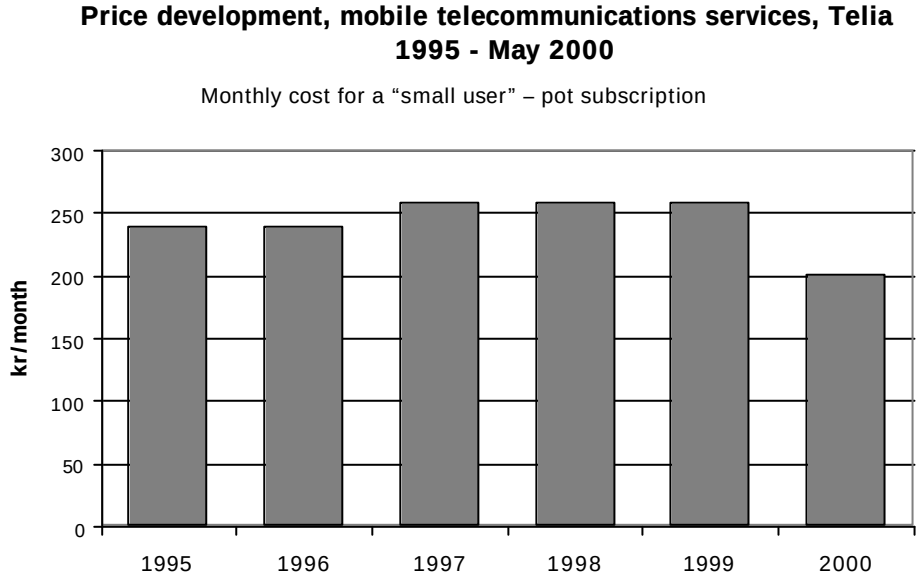


Diagram 19: **Price development of mobile telecommunications services, excluding value added tax**

In the diagram above we have chosen to illustrate the price development for a "small user" with Telia Mobile's "pot subscription" during the years 1995 – 2000. A small user has been defined as a user who makes 60 calls per month (2 calls per day), of which one call is made during the daytime and one call in the evening. The call which is made during the daytime lasts for one minute and the one made in the evening lasts for two minutes. Any price differences related to whether the call goes to Telia's own network or through some other mobile telecom operator's

network have not been taken into account. Regard has only been paid to the traffic costs and thus not to the subscription charge. The price excludes VAT. On the basis of the price changes that took place, this user has reduced his expense by 16% during the year 2000 compared with 1995, without having regard to the changes in the rate of inflation. The reason for the price for these services increasing between 1996 and 1997 depends on Telia having then introduced a starting charge of 0.32 öre, excluding VAT.

For further information concerning the price development of mobile telecommunications services, PTS refers among other things to the report that PTS prepared in conjunction with the Competition Authority and Consumer Agency: *The Swedish mobile telecommunications market from a consumer and competition perspective*.

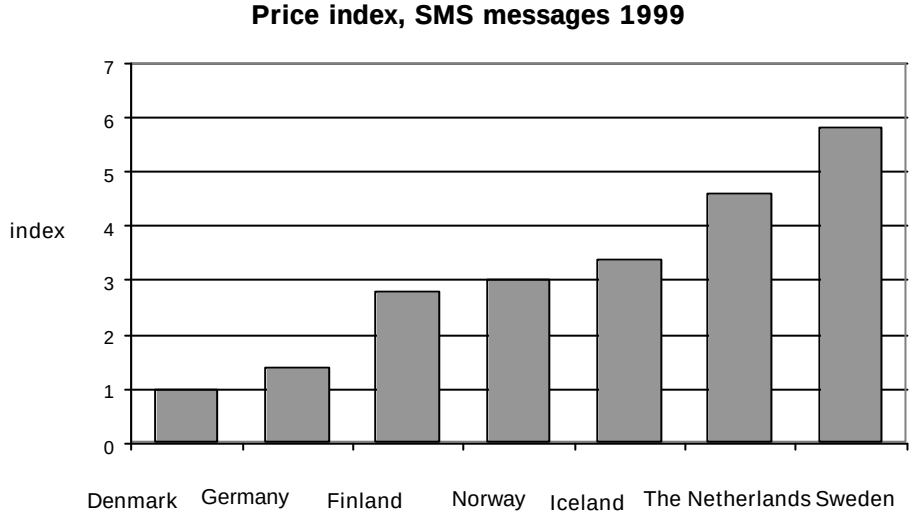


Diagram 20: **Comparison of price for SMS messages 1999**
Source: OECD

As mentioned, the price for SMS messages has been high in Sweden. In the above-mentioned comparison, the pricing for SMS was several times greater in Sweden[22] than in the Nordic countries during 1999. Up to and including 1999, the price for SMS services was 2.50 kronor per message. However, during the second quarter of this year, price competition for service commenced when Sense established itself on the market with, among other things, a lower price for the SMS service corresponding to 1.50 kronor per message. A price reduction by the other operators followed. Subject to the preconditions that Swedes react in line with inhabitants in the rest of the Nordic countries, this price reduction will probably generate significant volumes of messages sent, and ultimately represent a profitable measure on the part of the operators.

[22] In this comparison it is Telia's price that is compared

Even with mobile telecommunications services, interconnection charges will probably have a great influence on the price to the end user. On 1 July 1998, PTS made a decision that Telia has a significant influence on the market for interconnection in Sweden and was thereby subject to the obligation to base interconnection charges on costs for calls in the mobile network. As a consequence of this decision, PTS directed Telia to reduce interconnection charges by on average 20% in May 1999. Following further scrutiny of the basis of computation, Telia was directed on 31 May this year to reduce interconnection charges further as of and including 1 July 2000, to 1.13 kronor per minute on average. Telia has appealed against the decision to the County Administrative Court.

It was hoped that the reduction of the interconnection charge would also be reflected in the price to end user. This proved to be the case from fixed to mobile, although the decrease did not result in any immediate change to the price per minute for calls from one mobile telephone to another mobile telephone. However, it is probable that the reduced traffic charges have had some effect on the price reductions for mobile to mobile that have commenced. Hopefully, the current trend towards lower prices will continue.

Subsidies

The mobile telecom operators' subsidies to distributors on sales of mobile telephones have also continued over the last year. It had been hoped to be able to reduce this cost in time, which has not yet been possible. In pace with new telephones and new sought-after functions being launched, the packaging of telephones and subscriptions at a low initial cost for the customer involved a good opportunity for the respective operator to increase its customer stock. According to MobilTeleBranschen, approximately 1.75 million mobile telephones were sold during 1999, while the number of subscriptions only increased by one million. During 1998, the subsidies on average amounted to approximately 1,800 kronor per telephone; according to information received the subsidies have now increased to 2,000 kronor per telephone during the last year. Customers will also in the future need new telephones with new functions in order that the new services and technology may be used. There is thus nothing to suggest that the subsidies will disappear in the next few years.

4.6 Market situation

At present there are three parallel GSM networks in Sweden. All three satisfy the coverage requirements that the licences prescribe. The investments that mobile telecom operators make in the infrastructure are upgrades to new technology such as HSCSD and GPRS and concentration within the areas where they already have coverage. It is a small part of this investment that is devoted to increasing the territorial area of coverage.

Up to the turn of the year 1999/2000, Telenordia had access to frequencies in the 1800 band and there was thus an opportunity for a fourth telecom operator to develop an infrastructure for mobile telecommunications services. However, in the market situation then prevailing, with three well-established mobile telecom operators with access to national coverage, in combination with a very mature market, there was little scope for profitable business for services in the 1800 band alone.

The market for mobile telecommunications services differs from the other telecommunications markets because access to frequencies is limited. There are thereby natural impediments on how many networks can be developed for this purpose, and thereby also on the number of network operators. At present, it is mainly network operators that also offer services based on the network infrastructure that inhibit development compared with a market with free opportunities for establishment.

The progress in developing mobile telecommunications services is led today by suppliers, mobile telecom operators and service providers in collaboration. As the mobile telecom operators have a leading position, at the same time as they own the networks and offer services, they have not needed to consider their position in the value chain. No limitation has been made, but they have instead been involved in the entire chain. In pace with capacity being increased in the mobile network, there is increasing focus on investments in the development of more advanced data communications services. This development is taking place both under the mobile telecom operators' own auspices and by collaboration with various service suppliers. Service suppliers often have contracts with one of the mobile telecom operators and it is difficult for a service supplier to get a contract with more than one operator. As a means of competition, the individual mobile telecom operators have a unique range of services. There is thus a clear link between service and operator. This ties the service supplier, which cannot reach out with its service to the entire Swedish population but only to a limited extent. One example is that a customer who wishes to use his mobile telephone for banking transactions can only make use of the bank that the telecom operator collaborates with, or only use the telecom operator that collaborates with the bank that the customer uses. If several parties enter the market and if the number of service developers increases and attains a stronger position, it may be possible to alter this situation. Compare, for example, the Internet market which is to a large extent completely open for service suppliers and where users reach all services irrespective of which infrastructure they are connected to.

The development and launch of more advanced information and data communications services is expected to accelerate in conjunction with the mobile network being upgraded to the packet communication technology GPRS[23]. Through this, a technique has been implemented into the network that is adapted, and thereby more cost-efficient, for services based on TCP/IP, i.e. Internet services. The reason that this technology is cost-efficient is primarily related to the

[23] General Packet Radio Service

network's capacity only being used when the user actually uses the network, compared with the circuit-switched network where the user utilises the network for the entire time. GPRS thus facilitates an "always on" connection with the mobile network, but only debiting for actual use. According to information from the mobile telecom operators, GPRS will be introduced at the turn of the year 2000/2001. However, the market effect of this upgrade is governed by access to terminals from the operators. The issue of terminals is an area that involves uncertainty for mobile telecom operators in their planned rate of development. A further upgrade of the GSM network is planned for 2002, when a new form of modulation is introduced in the radio signals, EDGE[24]. This technology will make speeds of up to 384 kbit/s available.

As GPRS and EDGE are only upgrades of the existing GSM network, there is great opportunity for national coverage. By the supplement relating to technical upgrades of existing infrastructure that the licence conditions now include, it is likely that national coverage may be achieved rather quickly.

4.7 Legislation

As previously mentioned, PTS submitted a proposal for amendment of the Telecommunications Act in May 1999. The proposal means that the existing owners of the GSM network would be forced to sell network capacity to other undertakings in order to thereby increase the number of suppliers, and at the same time reduce vertical integration, of mobile telecommunications services in the Swedish market. The Government decided on an amendment, which entered into force on 1 May 2000, involving an obligation for the network owners, Telia2/Comviq, Europolitan and Telia, to sell excess capacity on fair market terms to undertakings who so wish. It has not been possible to discern any effects of this statutory amendment in the market. The SP contracts that have been concluded were concluded before this amendment and were made on commercial terms. According to information that was obtained during the interviews, discussions are continuing concerning similar voluntary contracts. A general view on the part of those existing telecom operators who do not have access to mobile telecommunications services is that the Act that was finally introduced was far too tame and therefore the effects achieved as a consequence of the Act will not be particularly extensive.

In January 2000, PTS submitted a further statutory proposal to the Government concerning national roaming. The legislative provision means that certain mobile telecom operators[25] have an obligation to grant access to their network to new mobile telecom operators that have obtained a licence for their own network, where the latter does not have coverage. The grant is to be made on fair market terms. Such a statutory amendment means that a newly established operator may

[24] Enhanced Data rates for GSM Evolution

[25] Subject to the precondition that the mobile telecom operator has had a licence for at least five years for this service. For example, Telia, Tele2/Comviq and Europolitan have had licences for GSM for more than five years.

through a contract immediately offer coverage in the same area as a supplier who is already established. The right to roaming applies for seven years after establishment. The decision on the legislative amendment was made on 14 June this year. The Act is primarily introduced to support new mobile telecom operators and the development of third-generation networks. Views on what effects the Act will have are divided, where the existing mobile telecom operators envisage a risk that increased traffic volumes will call for major investments on their part. However, other telecom operators consider that even this Act is too tame and that the effect will be marginal as the rules only favour a new mobile operator that has access to its own network.

A further alteration in the mobile market will take place on 1 September 2001 when number portability in the mobile network is introduced. This will make it possible for mobile customers to retain their existing mobile telephone number when they change telecom operator. As the change of mobile telephone number may be a reason for a subscriber not to change operator, the hope is that this will facilitate customer mobility. The change comprises both subscription and pre-paid card customers.

The background to these legislative amendments and proposals for legislative amendments is that PTS did not consider that the former legislation was sufficient to develop competition in the mobile telecommunications market in a satisfactory way. It is hoped that these legislative proposals will facilitate establishment by new parties and that the market for service development in the mobile network is stimulated.

4.7.1 UMTS

UMTS is the third-generation mobile telephony service and the successor of GSM. With UMTS terminals, users will be able to gain access to data communication and multimedia side by side with ordinary telephony. The transfer speed in UMTS amounts to at most 2 Mbit/s, which can be compared with the current speed in the GSM network of 9.6 kbit/s (without any upgrade such as, for example, HSCSD).

PTS will issue four national licences for the provision of network capacity for mobile telecommunications services in accordance with the UMTS/IMT-2000 Standard in Sweden. In order to improve the market conditions for new operators, up to two new mobile telecom operators will also be granted licences for GSM activities. The assessment of which undertakings will be allocated UMTS licences is made on the basis of several criteria such as the operator's financial capacity, technical plans, business, market and investment plans, expertise in the field of mobile telecommunications, and also the development plans for the UMTS network. The licences will be granted to operators who can provide the UMTS network with the most rapid and extensive distribution in Sweden as possible.

The time schedule is as follows:

PTS invites undertakings to apply for licences	12 May 2000
Applications must be submitted to PTS by	1 September 2000
Licences allocated	November 2000

The frequencies that will be allocated in accordance with ITU's IMT-2000 Standard are in the frequency bands 1900 – 1980 MHz, 2010 – 2025 MHz and 2110 – 2170 MHz. The frequencies for GSM licences are in the 900 MHz and 1800 MHz bands. The licence holders for UMTS will obtain 2x15 MHz (FDD[26]) + 5 MHz (TDD[27]).

As already mentioned, radio frequencies are a limited natural resource. It is today difficult to determine how many frequencies will be needed in order for a third-generation mobile network to be able to be used satisfactorily. In order to increase frequency access for third-generation mobile networks, PTS has, among other things, submitted a proposal suggesting that the radio frequencies that are released in conjunction with the digitalisation of current analogue television should be made available for mobile telecommunications services.

There is great interest in UMTS and there are many who have now already decided to apply for a licence either independently or together with others. It is not possible today to say how many applications will be submitted. In Finland, 15 applications were received, Great Britain and Germany received 13 applications each and Spain 7. Those telecom operators that do not submit an application for their own licence emphasise the importance of those networks that are being developed becoming significantly more open for service suppliers than the three existing GSM networks.

For further information about UMTS, PTS refers the reader to PTS homepage, www.pts.se.

[26] FDD spectrum in the frequency bands 1920 – 1980 MHz with duplex on 2110 – 2170 MHz
[27] TDD spectrum in the frequency bands 1900 – 1920 MHz together with 2010 – 2025 MHz

5. The Internet

The development of the Internet has mushroomed in Sweden since it became established on a broad front in 1996. Growth has been great both among businesses and households. The number of businesses with access to the Internet has increased dramatically during the last three years. According to an investigation conducted by the analysis company Stelacon, 74% of all of Sweden's businesses were linked to the Internet at the beginning of 2000. The corresponding figure for the previous year was approximately 40%. Growth has also been great on the domestic side. At the beginning of 2000, approximately 45% of Swedish households had access to the Internet from the home, which can be compared with a corresponding figure for the previous year of approximately 30%.

5.1 Parties

Since the Internet was introduced as a commercial service at the beginning of the 1990s, a large number of parties have established themselves in the market. The Internet market in Sweden is characterised by intensive competition between a large number of parties. The market has relatively low obstacles on entry and a low level of regulation. However, note that the Internet is subject to the Telecommunications Act and the provisions of the Act concerning, for example, interconnection also thereby apply to the Internet.

Only a few Internet Service Providers (ISP) are subject to the duty to report according to the definition in the Telecommunications Act. On the basis of an estimate of the market, there are at present some 100 ISP in the Swedish market where the number in recent years has declined rather than increased. One explanation for this is, among other things, that the smaller ISP have found it more difficult to hold their own in relation to the major ISP in pace with the stiffening competition. Furthermore, a large proportion of customers are seeking an increasingly broad range of services at the same time as there is severe pressure on prices for both subscription and traffic charges. This development will probably result in increased concentration of the number of ISP.

A customer today can connect to Internet in several different ways: via a leased connection; via PTSN; ADSL[28]; ISDN; cable television; radio; etc. The various forms of connection differ from each other primarily as regards capacity. The most usual form is at present dial-up connection via modem in the ordinary telephone network, PSTN.

The majority of ISP offer dial-up access to Internet via modem or ISDN. Some parties, including Telia, Tele2, Telenordia, Sonera, WorldCom and Global One offer fixed access, via leased lines connections, to the Internet. This thus means

[28] Asymmetric Digital Subscriber Line

that the customer is always on to the Internet. In addition to this, there are a number of different kinds of access that may be described as an intermediate stage between dial-up and fixed access, for example ADSL. These forms of access are offered partly by the traditional ISP such as, for example Telia and Tele2, and also by power supply companies and cable television companies, among others.

The largest parties in the Internet market are Telia, Tele2 and Telenordia. These three parties entered this market at an early stage and today are comprehensive suppliers of Internet services. They provide Internet access for both business and households throughout Sweden and also closely related services such as, for example, Webbhotell and the like. Among the other parties in the market there are full-service suppliers who normally focus on selected customer segments, geographical areas or technical specialities.

The Internet market is probably only at the beginning of the market which will develop as regards business opportunities, user areas, services and applications. Furthermore, the Internet market is continuously influenced by a large number of factors in the surrounding world such as technical, political and legal changes. One change which is expected to have great consequences for future development is the introduction of alternative or more rapid access methods (broadband access).

5.2 Market volume

As we have mentioned, there are several different forms of connection to the Internet, of which the most usual is dial-up access with modem via the PSTN network, or with ISDN. Fixed connection is almost exclusively used by business and then primarily by those who have homepages or similarly located on servers at their own premises and/or have significant volumes of traffic to the Internet.

5.2.1 Dial-up access

At the end of 1999, there were in Sweden approximately two million dial-up accesses to the Internet. Of these, approximately 400,000 are commercial subscriptions and 1.6 million private subscriptions. However, it is worth noting that one and the same subscription is often used both for the business and for private use, and also that some households have more than one subscription and in other cases several households share one and the same subscription. Of the dial-up accesses, approximately 150,000 are of the kind ISDN and the others via PSTN. Besides these accesses, there are an estimated approximately 40,000 so-called broadband accesses of the kind ADSL, cable television or other means. Compared with 1998, the number of dial-up accesses has increased by just over 30%.

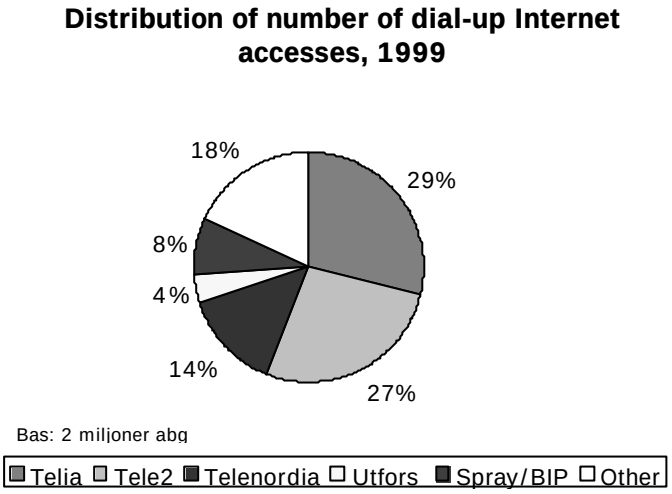


Diagram 21: **Distribution of number of dial-up accesses to the Internet, 1999**

The three largest parties Telia, Tele2 and Telenordia have a leading position in both the commercial and private market. Telia is largest with a share of approximately 29% of the total number of dial-up accesses. Tele2 has a share of approximately 27% and Telenordia's share amounts to approximately 14%. Spray, Utfors and most of the other parties have the majority of their customers in the private market and among small enterprises. In total, the other parties have a share of 30% of the number of dial-up accesses.

5.2.2 Fixed access

At the end of 1999, there were in Sweden approximately 3,800 connections via leased lines to the Internet, so-called fixed access. All of these are commercial subscriptions. However, it is worth noting that a group of companies often has one or a couple of fixed accesses to the Internet, which are then also used by their subsidiaries and the like. IT companies, for example WM-data, Enator and others, who normally cannot be regarded as ISP also provide fixed Internet access to their customers. The number of fixed accesses has increased by approximately 10% since 1998.

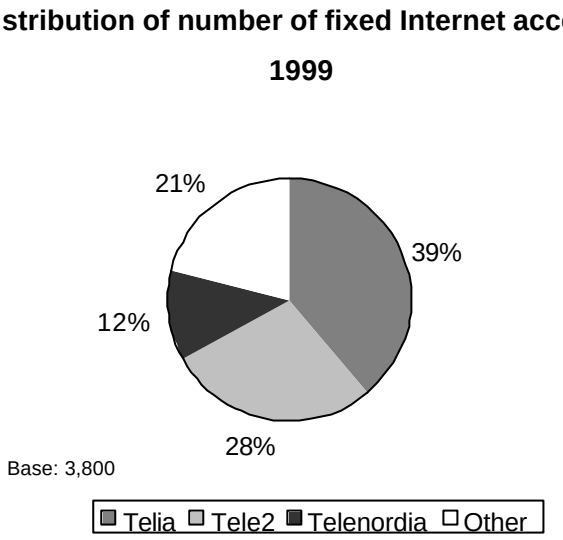


Diagram 22: **Share of number of fixed accesses to the Internet, 1999**

The three largest parties Telia, Tele2 and Telenordia are even more dominant in the market for fixed accesses than for dial-up accesses. Together, they have almost 80% of the number of fixed accesses. Telia has a share that amounts to 39% and Tele2 to 28%. Telia is thus more dominant in the market for fixed accesses compared with dial-up. Telenordia's share amounts to 12% and other parties have together approximately 21% of the number of fixed Internet accesses. Under the heading 'other' there are included companies such as Sonera, WorldCom, Global One, WinEasy, PI.se, Sunet, IBM, Enator and WM-data.

5.3 Market value

The value of the market for Internet access comprises both traffic and fixed charges.

The Internet market has experienced great growth in volume in recent years. Despite this, Internet access turnover is still rather small compared with fixed and mobile telecommunications services. During 1999, the market for Internet access had a turnover of approximately 2,000 MSEK, of which fixed accesses comprised approximately 300 MSEK. The total value of the market's value for 1998 was approximately 1,600 MSEK and in one year the value of the market has thus increased by approximately 25%.

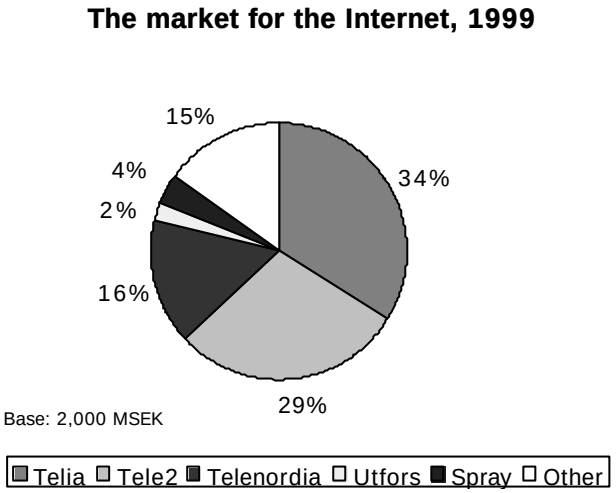


Diagram 23: **Market shares, Internet accesses 1999**

The three largest parties have in total almost 80% of the market. The two largest parties, Telia and Tele2, have market shares of 34% and 29% respectively. Telenordia's share amounts to 16% and other parties have in total approximately 21% of the market.

5.4 Services

What we normally call Internet services usually includes several different services. In order to obtain entry to the Internet some form of Internet access is necessary, i.e., connection to the Internet. When a household or company is actually connected to the Internet they can, via a so-called Web reader, read those pages that are on the Internet (World Wide Web), and also have the opportunity of using a number of various supplementary services such as e-mail, file transfer, arrangement of homepages and the like.

Internet access is available in different variants of which the modem or fixed access is the most common. Modem access is offered either at a fixed monthly cost, or free of charge. Costs for traffic via the modem accesses are always charged. As regards connection, only a fixed monthly charge is debited, which is dependent on the speed of the access.

When the customer subscribes to the Internet, a number of supplementary services are usually included in one of the standard packages. An example of what such a package may comprise, besides Internet access, is 1 to 5 e-mail addresses and 10 to 25 Mbytes space for a homepage on the operator's server. Besides these services, there are a large number of supplementary services that are related to homepages. They comprise an important part of the Internet service for both households and business and there is, particularly in the commercial market, a growing market for homepage-related services, for example e-trade.

Supplementary services that we will probably see more of on the commercial side in the future are, for example, applications that make it possible to implement secure payments over the Net.

In the private market, we can see developments where more customers are creating their own set-ups with supplementary services from parties other than those from whom they obtain the access. This applies to, for example, e-mail addresses (hotmail), homepage spaces and the like from various suppliers or via different Web Pages– often free. The realisation that the supplementary services are not automatically tied to the access is increasing in pace with users becoming better acquainted with this medium.

5.5 Prices

The operators can no longer impose such high subscription prices as they did when the Internet was introduced into the market. Although increasing numbers of households and small enterprises will have some kind of direct connection in the future, it is difficult for the operators to impose higher subscription charges. The customers who become used to a particular market cost for their Internet usage will probably not be prepared to pay significantly more for another form of access. Subscription prices will continue in the future to be the primary competitive tool for operators. This means that the growth in value from this kind of revenue will reduce although there are an increased number of customers who will use more advanced access forms.

However, telecom operators can compensate for this fall in the rate of growth through the increasingly important contents market. The contents suppliers are prepared to pay increasing amounts to reach end users. This means in turn that telecom operators obtain a greater proportion of their revenues from content suppliers. This development thus results in a value shift from the Internet access to the content.

Up to and including the autumn of 1999, the price for connection corresponded to the price of a local call. As of that date, the majority of telecom operators introduced a special tariff for modem-connected traffic to the Internet. However, it is worth noting that the price per minute to the Internet to a large extent is being maintained at the same level as an ordinary national telephone call.

5.6 Market situation

As mentioned in the section above, the Internet market is at present undergoing a revolutionary development, where the focus is being increasingly transferred from access to content. When the Internet started to be used on a broad front in Sweden, access was the most important, and with access came the ability to send e-mail, transfer files, search for information, etc. The revenues of ISP primarily

came from subscription charges and revenues from interconnection. The commercial logic was similar to that for telephony services, that revenue should cover the costs that the operator had in offering the access service and also generate some margin for the operator. This business logic still dominates as regards ISP but in recent years a number of new parties have established themselves in the market, and are applying a completely different business logic.

Revenues should no longer necessarily come from the subscription charges and traffic. The thought is instead that revenues should be generated from the advertisers and service suppliers who use the customer base that is built up through attractive subscription offers. For the parties who adopt this new business logic, the access service is not a revenue-generating service but a means of attaining new objectives. They are therefore prepared to incur a loss on the means, the access, in order to get closer to the objective, the content/services. This new business logic thus means in practice that subscriptions are subsidised by future revenues, which in the current situation also appear to be rather uncertain. This new business logic has not yet demonstrated its success from a financial perspective. There is great uncertainty regarding when, from whom and for what any future revenues that today subsidise subscription will be recovered. During this period, the deficit of many of these parties is mostly financed by risk capital companies and share purchasers. Compared with the market for fixed telephony and mobile telephony, the Internet market is significantly more dependent on the expectations, development and patience of the stock market.

The market for Internet access has itself “been infected” by the new business logic that is rooted in the World Wide Web, rather than in the Internet viewed as a communications network. During the last year this has resulted in a major reduction in prices for subscription charges, which has resulted in Internet access as a source of income reducing substantially. This has also brought with it a broader range of services within Internet access where “free operators” on the one hand offer subscriptions free of charge of relatively low quality, and traditional ISP on the other hand offer high-quality services with access to a wide selection of value-added services. However, for every new function or service that the operators produce, it does not take long before one of the parties who has adopted the new business logic offers it free of charge.

In pace with focus being increasingly transferred from access to content, access to the Internet becomes paradoxically even more important. In order to be able to use the content in the form of new services that have developed, it is required to have faster transfer speeds in the access than that offered through dial-up access in PSTN. For this reason, the need arises to increase the speed of data communications to the users.

Development of Internet accesses is not only taking place in the fixed networks but is also anticipated to have a strong future increase in mobile Internet access and associated services. The precondition for being able to use mobile Internet is that the user has some kind of hand-held/palmtop computer or mobile communicator/telephone that can be linked to the Internet.

However, the communications speeds in the mobile network are significantly slower than the fixed networks and the kind of mobile Internet service we currently see is primarily of the type micro web services. Examples of existing mobile Internet services are ticket-booking, weather reports, stock-exchange prices, bank balances and the possibility to implement various kinds of orders when travelling. The standard that is usually used today is SMS, and the services will be developed both in number and functions in pace with the WAP technology becoming more widely available.

6. Network capacity

Access to infrastructure is a precondition for a telecom operator being able to provide telecommunications services. Existing infrastructure exists today in the form of copper, co-axial, optical fibre and also from various radio-based solutions. A telecom operator can obtain access to infrastructure from other network owners by purchasing network capacity in either basic or value-added form. The nature and development of the competition situation relating to services to end users depends to a great extent on the market for network capacity. The market for network capacity is increasing from year to year, both in value and number of suppliers.

6.1 Parties and service range

The number of telecom operators that provide network capacity increased in the market during 1999. Totally viewed, there are some 80 undertakings that provide network capacity, of which eight undertakings have licences.

At present, the following undertakings have licences to provide network capacity:

- Telia AB
- Tele2 AB
- Global One Services AB
- The National Rail Administration (Banverket)
- MCI WorldCom AB
- Telenordia AB
- Sonera Sverige AB
- AB STOKAB

Besides these licence holders, there are just over 70 undertakings that have reported that they conducted activities within the field to varying extents during the year. The undertakings that reported include, among others, Teracom, Svenska Kraftnät, Evicom, Utfors and Tekniska verken i Linköping. Of those that reported, approximately one quarter have a core activity of supplying electricity or operating as an Internet Service Provider (ISP).[29]

The parties who provide network capacity in the Swedish market offer services that vary as regards geographic coverage, transmission technology and level of value added.

[29] See schedule on http://www.pts.se

Type of network capacity	Examples of suppliers
Backbone network	Telia, Teracom, Svenska Kraftnät, Banverket,
Regional network	Telia, Vattenfall, Birka energi, Sydkraft,
Local network/ City network	Telia, STOKAB, lokal electricity suppliers
Access network	Telia, Bredbandsbolaget, cable TV companies

Diagram 24: **Parties in the market for network capacity**

Those telecom operators who offer network capacity currently comprise three main groups:

1. Companies that own their own infrastructure and sell it in the form of basic network capacity or network capacity with limited value added. They normally have access to the infrastructure for telecommunications in their own activity, an activity that is not defined as telecommunication. This kind of party does not intend to provide highly value-added telecommunications services such as telephony services.

2. Companies that ordinarily own their own infrastructure. They ordinarily provide network capacity in the bandwidth of 2 Mbit/s and above. In order to supplement their own infrastructure, they lease basic and value-added network capacity, in order to offer value-added network capacity further to other telecom operators, major customers, ISP, etc.

3. Companies that own or lease basic and value-added network capacity and sell complete telecom services further. They normally sell leased lines with a capacity between 64 kbit/s and 2 Mbit/s. These supplies often assume greater responsibility for service, monitoring, etc., than the two mentioned above. Their customers are normally telecom operators and ISP without any own transmission equipment. Many of their customers comprise enterprises that operate as distributors.

The existing parties in the market for network capacity must often supplement their own range with that of others in order to be able to offer the service that the customer demands. In contrast to the more value-added services, this has resulted in them operating as both customer, competition and collaborating partner with others.

6.2 Market value

The market for the provision of network capacity in accordance with the Telecommunications Act had a turnover of 2,700 MSEK during 1999. The largest

market comprises sales of value-added network capacity to other telecom operators and end users; this market is estimated to constitute 90% of the value of the total market. Value-added network capacity is normally sold as leased lines in capacities of, for example, 2 Mbit/s. The remaining 10% is thus sales of basic network capacity of some kind, for the most part black fibre.

The largest part of these revenues come from sales to telecom operators, i.e. to undertakings that provide services to end users such as telephony and the Internet. Sales of network capacity to telecom operators amounted to approximately 1,900 MSEK during 1999. The remainder, 800 MSEK, were revenues from sales to end users. The difference with the services previously described (fixed telephony services, mobile telecommunications services and the Internet) is that the market for network capacity is consequently a market between telecom operators.

6.3 Market shares

Measuring the market and market shares of network capacity involves problems as there are sales at various phases. If the market is measured in similar ways as for fixed and mobile telephony, i.e. from the end user, then a large part of the market is excluded. A substantial part of this market occurs between parties that add value to services in order to sell on "complete" services to end users. In order to gain an indication of the activity in the entire market and all parties, PTS has chosen to include all sales that are covered by the definition 'network capacity' under the Telecommunications Act, i.e., from basic network capacity to a leased connection to an end user.

The market for network capacity, 1999

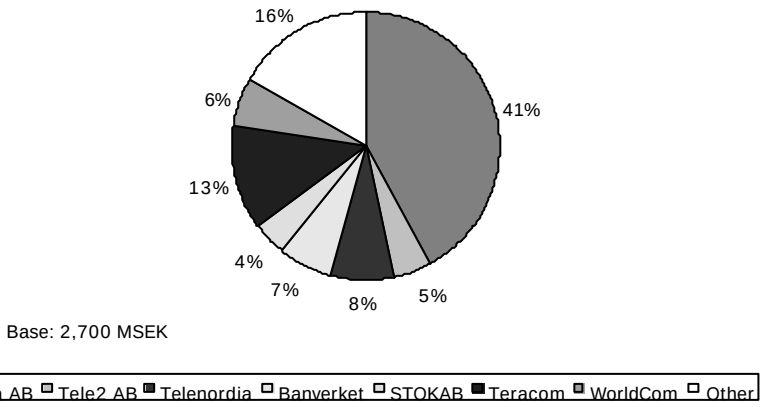


Diagram 25: **The market for network capacity, 1999**

The major party in this market is Telia, with a market share of 41%. There are many competitors though substantially smaller than Telia, and they act in limited parts of the market.

6.4 Market situation

During 1999, the market for network capacity has developed positively. There are several active undertakings and competition is improving. So far, the market comprises many small parties, from the perspective of revenues, but they are in a phase of development that will probably alter this profile during the next few years.

Existing parties consider that competition is very hard with basic network capacity, primarily black fibre, and value-added network capacity in the bandwidths from 2 Mbit/s and upward. Furthermore, the majority of alternatives are in urban areas and between urban areas, i.e., on the backbone network, regional network and also local/city networks. It is probable that this situation will become clearer in the future, as it is within these areas that activities are planned. At present, we can thus conclude that competition varies widely depending upon the service and which geographical area is involved.

Developments are tending towards a continuously growing market where all customer segments demand ever-increasing capacity. Furthermore, new types of customer arise which enter at the bottom and demand lower bandwidths, e.g. Internet Service Provider, new telecom operators, end users on the Internet and others. The market is characterised by a broad spectrum of different customers, from telecom operators with substantial resources of their own to enterprises and organisations that need the highest level of value added possible for the service. Thus, knowledge on the part of these customers also varies to a great extent and it is almost impossible for the existing parties to include all customers in the target group. The majority of the new parties do not have any lengthy background in the telecommunications market and therefore have had less extensive activities for sales of network capacities. In order to attain commercial viability and profitability, they are now working on surveying this market and preparing their strategies and business plans.

Current developments within network capacity suggest that competition will be increasingly stiff, both as regards the number of alternative parties and geographical coverage. However, the alternative opportunities still have limitations as regards the network capacity required to link the customer, i.e., the access network.

6.4.1 Access network

Access to the local loop is of very great importance for a telecom operator that provides services because it is first through this asset that the ability to directly

connect customers is found. At present, there is a very small proportion of Swedish businesses, organisations and households that are included in the target group for direct connection by the existing telecom operators; see the discussion conducted above. By the customer choosing to directly connect to a telecom operator, he thereby gives notice terminating the relationship with the previous telecom operator, usually Telia. This means that the telecom operator chosen obtains a completely new and closer relationship to the customer. The advantages that a direct connection of a customer brings with it are that the telecom operator gains access to the entire customer's communication and thereby revenues, both fixed charges and all traffic (outgoing and incoming traffic), greater opportunities to further develop the customer's existing telecommunications services, greater opportunities to provide packages with, for example, the Internet and other data communication.

Currently there are various forms of access to choose from to connect an end user. The available forms of access are largely the same as during the year 1998 and comprise the copper network (PSTN, ISDN, xDSL), the electricity supply network, radio-based network (GSM, radio link, radio point to multipoint), satellite, the cable television network and optical fibre. Optical fibre is considered to be the most superior technology for telecommunications, both today and for the foreseeable future. What technique is used in practice depends upon several factors: what service is to be provided; access to existing technology within the field in question; kind of customer together with the expense for connection.

The copper network

The copper network is unique as regards distribution since, largely speaking, all households and businesses are already connected by copper. However, from a competition perspective, the copper network has associated inadequacies as Telia is almost the only telecom operator owning and controlling the network. The fact that other access networks have been developed is primarily the result of expansion of the Internet and not in order to offer telephony solutions. Other telecom operators have had a great need to be able to connect users to the Internet in a way other than via the copper networks, to which they have limited access. During the period that the telecommunications market has been open for competition, access to the copper network has been one of the most debated areas, where telecom operators have demanded a statutory amendment that would allow access to the local loop. The alternative telecom operators to Telia claim that it is one of the most important factors for the telecommunications market to be able to operate on equal terms. The subject has attained even greater importance with the arrival of the opportunity to use the frequencies in the copper network for rapid connection to the Internet, xDSL. There were great expectations that this would resolve itself when PTS presented a statutory proposal for the introduction of LLUB to the Government in the autumn of 1999. It is worthy of mention that the EU also published their recommendation in April 2000, where the Member States were encouraged to work for the introduction of LLUB. However, PTS's proposal must be investigated further, as

there is the risk that LLUB conflicts with the Fundamental Law on Freedom of Expression (*Yttrandefrihetsgrundlagen-YGL*). The following reasons were given in the Government IT Bill 1999/2000:86, page 91:

> ”The provisions of Chapter 3, Article 1 of the Fundamental Law on Freedom of Expression mean that every Swedish citizen and Swedish legal entity is entitled to broadcast radio programmes by wire. It cannot be excluded that an obligation to provide access to one’s access network involves a limitation of this constitutionally protected right for the network owner. The relationship of this issue regarding the Fundamental Law on Freedom of Expression must therefore be deliberated upon before any proposal for legislation may be presented.”

The investigation is being conducted within the framework of the Media Constitutional Law Commission within the Ministry of Industry, Employment and Communications. If it should transpire that the introduction of LLUB violates the YGL, but that the ambition is nevertheless to as soon as possible introduce LLUB, an amendment of the YGL is necessary. To amend a Constitutional Law in Sweden, it is required that a decision is taken for amendment by two Riksdags (Swedish Parliament) with an intervening election.

Irrespective of whether or not there is legislation on LLUB, Telia has since March 2000 offered other telecom operators access to the copper network, through the service “copper service” which involves access to the consumer’s telephone jack at a cost of 1,500 kronor per year and customer. They have also produced a ready-packaged ADSL service. At present, a few telecom operators have concluded contracts with Telia concerning copper services and several discussions with further operators are being conducted. However, the price is considered to be high as the telecom operators compare the price with Telia’s subscription charge of 1,008 kronor per year and customer. With such pricing they find it very difficult to see any profitability in using the service for direct connection of a subscriber for fixed telephony. However, Telia claims that the price for the subscription charge for fixed telephony is too low in relation to the costs. This market situation originates from Telia, which was considered to be the dominating party in the market, being subject to a price ceiling for fixed charges. In order for it to be possible to introduce LLUB and for it to operate in practice, it is therefore necessary that the price ceiling is reviewed.

In order to directly connect businesses, the alternative telecom operators usually lease a connection from Telia. For this telecommunications service, Telia’s service “Telia Link X-Line” is normally used and for the Internet service “Digitel”. The difference is that the former is a more value-added service than the latter.

Electricity supply network

During 1998, great attention was paid to the use of the electricity supply network as an access network for telecommunications services. As the suppliers of equipment encountered difficulties in making these techniques cost-efficient, interest waned and several trial projects were discontinued. However, according to

information received from parties, this technology is once again being developed by companies such as Siemens and Alcatel. There are several parties in Sweden among the electricity supply companies who are monitoring developments in the hope that this could possibly be an alternative form of access.

Radio-based network

Radio-based access networks are already used today in various forms. Among other things, radio links are used to resolve communication to/from or within a business, although to a less extent because of access to optical fibre increasing. Optical fibre is the superior radio link-based solution, as fibre is both more cost-efficient in time and also offers higher speeds.

Besides radio links, there are radio access solutions for point to multipoint. Relying on the Radio Communication Act, such licences have been granted to those who have applied (to the extent that clear frequency capacity was available). However, this has been altered and, according to new provisions, the consideration of licences shall be conducted through an open invitation for application. However, the procedure for the allocation has been delayed by PTS, but according to the currently applicable time schedule the guidelines should be ready in September and the licences issued during 2000. The frequency bands stated below will be allocated: part of the band 3.4 – 4.2 GHz, part of the band 24.5 – 26.5 GHz, the band 27.5 – 28.1 GHz, the band 29.1 – 29.5 GHz, the band 31.0 – 31.3 GHz, the band 41.5 – 42.5 GHz. Interest in these licences is great and several telecom operators have conducted trial activities for one to two years. These frequencies are viewed as a possible alternative form of access to the fixed network and access is desired as soon as possible. Telecom operators that today offer fixed telephony services and/or network capacity have expressed their disappointment about PTS's protracted handling of the application procedure and concerning the conditions that will apply.

The largest radio-based access networks are the three existing GSM networks, to which all customers of mobile telecommunications services are currently connected. However, the disadvantages of these networks are their limited capacity and also that the networks are only to a very limited extent available to anyone other than mobile telecom operators themselves. By an upgrade to new technology and the introduction of UMTS, together with increased accessibility for other parties, the radio-based network will with time attain increasingly great importance as an access network technology.

Cable television network

Cable television is an access network infrastructure that is in the process of being developed as an alternative means of reaching households. In Sweden, approximately 4 million households have television of which just over 2 million are connected to cable television. The telecom operators Tele2 and Telia are also

the dominant undertakings in the cable television market. The third largest party in this market is UPC (formerly StjärnTV).

In contrast with the telecom and ISP, customers of the cable television companies are already directly connected. By modifying their cable television network, they can also provide telephony and Internet services to their customers. Trials with broadband via cable television have continued for several years and during 1999 offers were launched for "broadband" to a large number of households with cable television.

Optical fibre

In contrast with copper cable, optical fibre has in theory infinite capacity and the limitation for which speed that can be communicated through the fibre cable depends upon the terminal equipment. Optical fibre is being used so far to a limited extent in the access network. In the case of new construction, the costs of developing an infrastructure of optical fibre or copper do not differ from each other to any great extent. However, because another infrastructure is already in existence, the investment costs for the development of optical fibre are significantly greater and the utilisation of alternative infrastructure is preferred. However, access to the local loop is limited and this together with substantial reduction in the prices of fibre in recent years, has meant that several undertakings have commenced, and are about to commence, looking at the possibility of also using optical fibre in the access network. Through the market for telecommunications growing, and thereby also the market for network capacity, the commercial opportunities will increase by such a development.

7. Trends in the market

Increased complexity in range of services

For the end user, the market's development has involved increasing complexity as regards options. The private market faces the problem of choosing between a number of parties with different pricing. As the primary means of competition is the price, it is important for a telecom operator to appear to the consumer to be the least expensive. However, who is really the least expensive depends upon the consumer's call behaviour, something which the consumer finds difficult to comprehend. However, awareness has become better and a number of aids are available to the consumer to make a better choice, for example on the Internet and in the mass media. The commercial market is now facing more problems than the price of a service alone. Increasingly complex technical solutions and packages of services mean that the consumer's own competence is often insufficient to be able to make the most rational choice. Packaging of services also makes it increasingly difficult to compare prices between various offers. As a result of this complexity, wider user groups and thereby adequate knowledge on the part of the customers themselves often has the consequence that the customer begins to buy functions and customer values instead of a specific technology and service. It has been discussed for a long time that we would see the emergence of consumers that focus on functions, though this never seemed to materialise. However, this is now changing. Due to these changes in customer profiles we now see an increase in demand by customers for assistance with procurement from telecom operators and also consultants specialising in such services. Demand increases both as regards advanced comprehensive solutions and telephony services alone.

Competition from other sectors

In the arena of telecommunications services where telecom operators have been active to date, the competition that has occurred has primarily involved the traditional parties. However, the market is widening and increasing numbers of parties are entering and wish to compete for customers in the telecommunications market. There is severe competition from the Internet and other communications undertakings and also enterprises within other sectors such as electricity companies, insurance companies, electronics companies, etc. All have the common feature that telephony is only a service to have as a supplement to their other range of services and products. The decisive factor in this battle is to obtain control over the end user.

Communication-intensive individuals

The development of the telecommunications market is tending towards an increase of tailored made functionality. By both the fixed and mobile telecommunications services and also Internet services now being used and developed for both private use and at work, the individual has had increased

opportunities to attain advanced knowledge and greater user levels than previously. This development is particularly manifest in small enterprises where today there are very small businesses that are regarded as belonging to this group of communication-intensive enterprises. The reason is that individuals themselves possess knowledge and the freedom to develop their own communication environment. In order to continue to promote this development it is important that it is provided scope to design the workplace according to each individual's own desires. In large companies the individual, generally viewed, is more tied to the IT environment and IT strategy upon which the company has decided, and freedom is more limited. The opportunity to use new services and develop one's own communication is therefore not as great for everyone, which in its turn may mean that these individuals develop at different rates. There is thus a risk that the gap between communication-intensive individuals and the individuals with low communication maturity grows unless this is taken into account.

Growth of mobile telecommunications services

Utilisation of mobile telecommunications services is growing in pace with time. In this report we have seen that the number of users is growing and the value for mobile telecommunications services is growing at a more rapid pace compared with the total telecommunications market. This is taking place in spite of the limitations that exist in the mobile networks relating to range of service, capacity and quality. Businesses are increasingly seeking mobile solutions and, according to the mobile telecom operators, the number of individuals who have only a mobile telephone is increasing. By the upgrades that are now planned in the mobile network and the access to the third-generation mobile network, the current limitations will be removed. This will probably mean that mobile telecommunications services become even more important in the next few years.

Vertical division

The telecommunications market has traditionally been vertically integrated, i.e., telecom operators have had control over the entire chain from network capacity to services to end users. At the time of deregulation, the telecommunications market started at the level of leased lines and finished with the telecommunications service to the end user. However, this market has deepened and today it may be regarded as commencing with channelisation and fibre in the street and concluding with a large number of content services. At the same time as the market becomes deeper, the vertical integration has started to be relaxed and instead the telecommunications market comprises increasing numbers of sub-markets. The sub-markets operate increasingly independently from each other and with various parties within the respective sub-market. Furthermore, the existing telecommunications market is being extended horizontally by the convergence that is taking place between, among other things, the markets such as telecommunications, media, entertainment and data communication. This will involve a further development towards more sub-markets and new parties.

Stock exchange launch and privatisation

Increasing numbers of businesses within the telecom sector have been launched on the stock exchange. To date, regulatory changes have rather little impact on share prices, although they have in some cases altered the market conditions to a great extent in the whole or parts of the telecommunications market. However, in pace with increasing numbers of businesses within telecommunications being listed on the stock exchange, regulatory changes are having an increasing influence on share prices.

8. Views on PTS

In conjunction with the interviews that were conducted, views concerning the role of PTS in the market have been received. Some of the comments that we consider have a natural bearing on this report have been listed below.

PTS has a great responsibility and an important role in the telecommunications market, and it is of extraordinary importance that it is used in the right way. By PTS forming the preconditions for the market that will prevail, PTS acquires the power and the mandate that is required. Market development is proceeding so rapidly that PTS cannot wait for a long time with important decisions in order to investigate the situation. PTS needs to adopt a stronger position in the telecommunications market.

A clear view on targets and clear operational rules are required. The Telecommunications Act is becoming increasingly unclear and many concepts that are difficult to interpret are used. This regulatory uncertainty causes difficulties in conducting commercial assessments and thereby difficulties in determining strategies, business concepts and market plans. It is really only when there is a dispute concerning an applicable statutory text that a proper investigation of its importance is conducted and then all those effected are made aware of what really applies. More information about amendments and the effect the amendments on the operational rules in the market are required. PTS must look more at the market situation and also understand the situation for telecom operators other than Telia.

Even if the intention is that special regulation of the telecommunications market should disappear in due course, telecom operators consider that PTS and the Telecommunications Act will be required for a long time in the future. Through competition becoming increasingly severe, it is probable that the role of PTS will become more important during the next few years and a stronger authority will probably be required. With such development in the market, at the same time as there is an imbalance between the parties, it is unlikely that the problem will resolve itself.

Telecom operators have during the interviews emphasised the importance of the introduction of preselection. Preselection is a good function as telephony services are reached by indirect access. However, according to the operators, direct connection of subscribers is preferable and solutions to improve the preconditions for competition based on indirect connection ought to be regarded as an interim solution. The long-term objective must be that alternative telecom operators have the opportunity of directly connecting subscribers and telecom operators question whether the current pace of development with fixed telephony services is considered to be satisfactory.

Appendices

Appendix 1 – Companies interviewed

Alfred Berg Fondkommission AB
Banverket Telenät
Birka Energi
Europolitan AB
Facilicom Tele8 AB
Glocalnet AB
Global Telesystem AB, GTS
MCI WorldCom AB
MobilTeleBranschen
Rix Telecom
Route66
RSL COM Svenska AB
Sense Communications AB
Sonera Sverige AB
AB Stelacon
Svenska Kraftnät (Svenska KraftKom AB)
Sydkraft AB (Evicom AB)
Tele1 Europe
Tele2 AB
Telenordia AB
Telerian
Telia AB
Telia Mobile AB
Telitel AB
Teracom AB
Utfors AB
Vattenfall Regionnät AB

Appendix 2 – Description of companies

National Rail Administration (Banverket)

The National Rail Administration started to offer leased lines commercially during 1991. It has access to a fibre network of approximately 10,000 km along the rail track. So it therefore has a rather good geographical coverage of network capacity in Sweden. The National Rail Administration leases value-added network capacity in speeds from 2 Mbit/s and upwards; they also lease wavelengths. As its network only extends to the railway stations, it often collaborates with other local and regional parties in order to be able to offer complete solutions to customers. Its customers primarily comprise telecom operators but also ISP and businesses. Its head office is in Borlänge. The turnover from sales of network capacity amounted to approximately 180 MSEK during 1999.

Europolitan AB

Europolitan AB is a wholly owned subsidiary of Europolitan Holdings AB, which in turn is owned 71% by the British mobile telecom operator Vodafone AirTouch. Europolitan started to run its GSM network in Sweden during 1992. Europolitan has since the start orientated itself towards a target group that generates comparatively high traffic volumes. Europolitan Holdings AB also has the subsidiary Europolitan Stores AB, which is the company's distributor of mobile telephones. At present it has approximately 35 shops in Sweden. As regards revenues, Europolitan is the next largest in the Swedish market for mobile telecommunications services. Turnover for Europolitan AB amounted in 1999 to approximately 4,300 MSEK and it has approximately 1,000 employees. Its operational office is located in Karlskrona.

Evicom AB

Evicom AB is a wholly owned subsidiary of Sydkraft. Through the subsidiary Sydkraft Telecom, the company started to offer network capacity in 1992. It offers, among other things, network capacity in the form of black fibre and radio links to telecom operators, businesses and organisations in southern Sweden. Together with Svenska Kraftnät, Birka Energi and Vattenfall, they are laying approximately 2,000 kilometres of black fibre in a ring between Stockholm, Gothenburg and Malmö. This ring will be complete during the autumn of 2000. Evicom also studies future opportunities to use the electricity supply network as an access network for telephony services. The head office is located in Malmö. Turnover during 1999 amounted to approximately 50 MSEK.

Facilicom International Sweden AB

FaciliCom/Tele8 was established in Sweden by Tele8 during 1992. However, it was first in May 1996 that the activity started to operate. The company is owned by WorldAccess and is part of the American Armstrong Group. They offer indirect and direct connection for fixed telephony services to all businesses and households in Sweden. It is worth mentioning that they also offer premium rate telecommunications services in the Swedish market. FaciliCom/Tele8 also sells international traffic sales to other telecom operators in the Swedish market. During 1999, the company had a turnover of almost 500 MSEK and they have approximately 40 employees. The head office for the Swedish operation is located in Malmö.

Global One Services AB

Global One Services is a joint venture between Deutsche Telecom, France Telekom and Sprint. The company has conducted activities in Sweden since 1992. The primary target group is the commercial market, to which fixed telephony, Internet access and data communications services are offered. The head office is located in Stockholm.

Glocalnet

Glocalnet offers fixed telephony for private people and businesses by indirect connection. The company started its operations in Sweden during 1998 and focused on constructing its own international IP network and offering IP telephony in the Swedish market. By collaboration with Bredbandsbolaget the company is testing the market's call behaviour patterns and interest in telephony services at a fixed price. Its head office is located in Stockholm. The total turnover of the company amounted in 1999 to 30.6 MSEK and they had 42 employees.

GTS

GTS has been operating in the Swedish market since 1994 under the name Netsource. The American telecommunications company Global TeleSystems Group, Inc. purchased Netsource during 1998. By this change of ownership, Netsource altered its previous role as a telecommunications broker in the Swedish market, and GTS today focuses on offering services on the basis of its own European network. It mainly offers indirect and direct connection for fixed telephony and the Internet to companies and private people. The revenues of the company amounted to 259 MSEK and there were 100 employees during 1999. The head office for the Swedish operation is located in Stockholm

MCI WorldCom AB

MCI WorldCom AB has been established in Sweden since 1994. The company's primary target group is business and it offers direct connection for fixed telephony services throughout Sweden, and data communication and the Internet in Stockholm, the Mälar Valley, Gothenburg and Malmö. MCI WorldCom also acts as sub-supplier for a number of telecom operators in the Swedish telecommunications market by traffic sales, primarily international traffic. The head office for the Swedish operation is located in Stockholm. Revenue for 1999 amounted to almost 700 MSEK and it had approximately 250 employees.

NETnet International SA

NETnet started its operations in Sweden during 1994 as a telecommunications broker. However, during the last two years the company has developed to becoming a traditional telecom operator with its own network exchange. The company has since early 2000 been part of the American group World Access, of which Facilicom is also a part. They primarily offer telephony services to small and medium-sized enterprises in Sweden.

Rix Telecom

Rix Telecom primarily offers indirect connection of fixed telephony services and dial-up Internet access to private people throughout Sweden. The company has price as its means of competition. Its head office is located in Katrineholm and the company has 26 employees.

RSLCOM Sweden AB

The company is included in the global telecom group RSL Communications Ltd. RSLCOM has been established in Sweden since the end of 1994. It is primarily oriented towards private people and small and medium-sized enterprises in Sweden. It today offers indirect connection for fixed telephony services and also have a comparatively large activity within pre-paid telephone cards. It also offers data communications services to some extent. RSLCOM has 75 employees in Sweden and a turnover of 238 MSEK during 1999. Its head office is located in Stockholm and it also has activities in Gothenburg.

Sense Communications AB

Sense Communications AB is a wholly owned subsidiary of the Norwegian company Sense Communications International AB, which was founded in May 1999. The company's major owner is the store chain Elgiganten. The Swedish company started to offer mobile telecommunications services in April 2000. The

company does not have its own national network for mobile telecommunications services but bases its services on Telia's GSM network, to which it gained access by concluding a so-called service provider contract with Telia Mobile. Its business concept is to offer voice and Internet services based on mobile infrastructure. The target groups are at present private people and small enterprises in Sweden. The company has approximately 10 employees and its head office is located in Stockholm.

Sonera Sverige AB

Sonera Sverige AB is a wholly owned subsidiary of the Finnish counterpart to Telia – Sonera Corporation. Sonera Sverige is orientated towards advanced network services within data communication and telephony for business and organisations, which means that it primarily offers direct connection for fixed telephony service and the Internet. By Sonera acquiring the national network "Komnet" from Enator during 1997, it has comparatively large own network resources. These network resources are used for its own activities but capacity and traffic are also sold to other telecom operators in the Swedish market, who in their turn can offer indirect connection for fixed telephony services and the Internet.

STOKAB

STOKAB is developing and conducts a fibre-optic cable network in the Stockholm region. The number of fibre kilometres amounts to approximately 200,000 and the number of cable kilometres to approximately 2,200. STOKAB only leases black fibre. The customers comprise first telecom operators and second end users that use the fibre for internal use. Besides this, STOKAB leases capacity in the channelisation that was previously owned by the Stjärn-TV network. The revenue of the company amounted to 176 MSEK and the company has 89 employees.

Svenska Kraftnät

Svenska Kraftnät has an fibre-optic cable network that at present extends to around 10% of Sweden's municipalities. The company started development of optical fibre in 1994 and is primarily laying opto cable along the top of its power lines. The number of fibres in the stamnät varies from 24 to 196 and the network capacity is offered to telecom operators primarily in the form of black fibre. To some extent value-added network capacity is also leased at speeds of up to 80 Gbit/s per fibre pair. Together with Birka Nät, Sydkraft and Vattenfall, Svenska Kraftnät is building the so-called 'Opto Triangle'. The first step is the laying of approximately 1,700 km of fibre cable in the southern part of Sweden, which will be ready not later than December 2000. Svenska Kraftnät has also been assigned

by the Government to run fibre between the main municipal centres, which will be ready in the summer of 2002.

Tele1 Europe Holding AB

In Sweden, Tele1 Europe offers services for data, voice and the Internet to large and medium-sized enterprises. The focus is to take over and assume responsibility for the customers' communication solutions, i.e. comprehensive solutions that include fixed and mobile telephony, data communications and the Internet. It has been able to start offering mobile telephony services in the Swedish market since January 1999, when it started to act as service provider for Telia. Together with Utfors and Telia, it will construct a fibre network of 110 km between Norrtälje and Haparanda. Besides the head office in Stockholm, Tele1 has offices in Gothenburg, Malmö and Örebro. The turnover of the company amounted in 1999 to approximately 232 MSEK and it had 265 employees.

Tele2 AB

Tele2 is a full-service supplier of telecommunications services in Sweden. As a telecom operator it has been active in the Swedish market since 1993 and is at present, on the basis of turnover, Sweden's next largest telecom operator. Under the trademark Tele2, indirect and direct connections are offered for telephony and the Internet to private people and enterprises together with public data communications services to business. Mobil GSM services are offered to the private and commercial market through the trademarks Comviq and Tele2Mobile. Cable television services are also conducted within the Group via the trademark Kabelvision. Its head office is located in Stockholm. The total turnover of the company in 1999 was just over 8,000 MSEK.

Telenordia AB

Telenordia started its activities in Sweden in May 1995. The company is owned in equal parts by British Telecom, Tele Danmark and Telenor. Today it primarily offers fixed telephony services, Internet and data communications to companies and private people. Telenordia has developed its infrastructure by leasing network capacity from network owners such as the National Rail Administration, Telia, Utfors, STOKAB, and others. Telenordia's network is reached both through direct and indirect connection. Since the spring of 2000, it also offers mobile telecommunications services through 020 numbers. Telenordia has just over 550 employees and had a turnover during 1999 of just over 1,500 MSEK. It is thereby Sweden's third largest telecom operator. Its head office is located in Stockholm.

Telerian

Telerian started its activities in Sweden during the autumn of 1999. It offers small and medium-sized enterprises and also private people indirect connection to fixed telephony, services for telecom conferences together with pre-paid cards. The company does not have its own exchange at present but operates as a distributor for companies that have their own network. It also offers mobile telephony by so-called freephone numbers and call-back; there are also plans to offer Internet access within the near future. The head office for Telerian's operations is located in Malmö. The turnover of the company amounted to approximately 12 MSEK in 1999.

Telia AB

Telia AB is the largest party in the Swedish telecommunications market. Its range of services comprises all services that can be offered today in the Swedish market, for example fixed telephony services, Internet access, public and unique data communications services, mobile telecommunications services. In contrast to the other telecom operators, it can also offer direct connection for fixed telephony services for private people and small enterprises through the availability of the access network. The company is also dominant in the market for interconnection and network capacity, having the clearly superior access to its own network infrastructure. Services to end users are offered to the market by the business sectors Business and Private. Telia AB's total turnover in 1999 amounted to just over 52,000 MSEK.

Telia Carrier & Nät

Telia Carrier & Nät is the unit within Telia that sells national and international network capacity. The primary task of this business sector is to act as a wholesaler in the telecommunications market, and the most manifest change during 1999 is that the Company to an increasing extent is able to act independently from other business sectors and enterprises within the Telia Group. Of course, other Telia companies are major customers, such as Telia Mobile, Telia Kabel-TV, and others. It offers everything from basic network capacity to pure traffic sales. It started to make black fibre available first during 1998 and this has continued to be offered so far subject to certain geographical limitations. In pace with increase in demand, it is probable that the range of services from Telia also increases. During 1999, this business sector had a turnover of 24,000 MSEK in Sweden. It has approximately 3000 employees.

Telia Mobile AB

Telia Mobile, which is a wholly owned subsidiary of Telia AB, is a full-service service supplier also within mobile telecommunications services, i.e. its range of

services comprises the fields NMT, GSM, aviation telephony, personal paging, etc. It is worth noting that its network for NMT 9000 will be phased out at the end of 2000. Telia directs itself towards the entire market and has the objective of being able to offer comprehensive solutions. Telia Mobile is still the largest mobile telecom operator in Sweden. During 1999, it started as the first operator in Sweden to open its network for service providers for mobile telecommunications services. Telia Mobile's turnover amounted to approximately 10,000 MSEK in 1999.

TeliTel AB

TeliTel belongs to the American corporate group Galesi Group and established activities in Sweden in 1995. It offers fixed telephony services to business and private people, primarily though direct and indirect connection. The company focuses particularly on call-centre solutions. TeliTel supplements fixed telephony services with Internet access by acting as a distributor of Internet 5. By collaboration with BoNet, TeliTel is testing the provision of fixed telephony services, integrated in broadband solutions, at a fixed price. The company had a turnover of 66 MSEK and had just over 90 employees. Its head office in located in Stockholm, and the company has sales offices in Gothenburg, Umeå and Sollefteå.

Utfors

Utfors started its operations in 1995 with the business concept of providing students in Uppsala Internet connection at low cost. During 1998, Utfors developed as an Internet service provider and started to offer both dial-up and fixed Internet connections to business and private people. In conjunction with the introduction of preselection in Sweden, the business was also expanded also to comprise indirect connection for telephony services. Besides providing telecommunications services, Utfors started to construct its own infrastructure during 1999. Together with Tele1 Europe and Telia, it will construct a fibre network of 110 km between Norrtälje and Haparanda. The company has offices in Stockholm, Uppsala, Gothenburg and Överkalix. During 1999, the company had a turnover of just over 90 MSEK and has 86 employees.

Teracom AB

Teracom AB is a nation-wide radio-linked network for transfer of radio and television programmes. At present the network comprises just over 100 radiolink stations with a capacity of 155 Mbit/s. During 1995, Teracom started to offer network capacity to business and organisations, which took place in conjunction with the digitalisation of the radio network. Customers include telecom operators who provide fixed and/or mobile telecommunications services, Internet service providers and also major companies. The company offers value-added network

capacity, radiolink, primarily in capacities of 2 Mbit/s and up to 34 Mbit/s. In some business areas Teracom also acts as distributor of telephony and the Internet if the customer so wishes. The company had a turnover in total of approximately 2,300 MSEK during 1999.

Vattenfall

Vattenfall offers network capacity through its subsidiary company, Vattenfall Regionnät AB. During 1991, Vattenfall started to develop an infrastructure for telecommunication for its own activities. During 1996, it started to offer these services commercially, besides the extension it commenced in 1994 together with Tele2. Today it offers black fibre together with broadband to telecom operators and also to companies and organisations in those fields where their infrastructure is located. At present it has approximately 500 – 750 km in operation. Together with Svenska Kraftnät, Birka Energi and Sydkraft (Evicom), it is laying fibre in the so-called Opto Triangle; Stockholm, Gothenburg and Malmö. It can offer network capacity from the backbone network up to local networks, for example, city networks.