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**SHAPING THE FUTURE MOBILE INFORMATION
SOCIETY:**

THE CASE OF THE KINGDOM OF NORWAY

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Table of contents

1	Introduction	4
2	Country background.....	4
2.1	Geography and demographics.....	4
2.2	Political system.....	5
2.3	Economy	5
2.4	ICT sector overview.....	6
2.4.1	Telecommunications	6
2.4.2	Internet.....	7
3	The mobile market	7
3.1	Evolution of the mobile market	7
3.2	Market trends	8
3.2.1	Mobile subscriber numbers.....	9
3.2.2	Mobile coverage.....	9
3.2.3	Mobile voice traffic.....	10
3.3	The mobile commercial landscape.....	11
3.3.1	Market shares	11
3.3.2	Mobile pricing and revenue	12
3.3.3	Key operators	14
3.4	Mobile data services	16
3.4.1	Short Messaging Service (SMS).....	16
3.4.2	General Packet Radio Service (GPRS).....	18
3.4.3	Universal Mobile Telecommunications System (UMTS).....	18
3.5	Mobile content	19
3.5.1	Broadcasting.....	20
3.5.2	Publishing.....	21
3.6	Wireless LAN	21
4	Mobile regulatory framework	22
4.1	Ministry of Transport and Communications.....	22
4.2	Norwegian Post and Telecommunications Authority (NPT).....	22
4.3	Key legislation and regulations.....	23
4.4	Key decisions.....	23
4.5	Health and mobile use.....	24
5	The mobile information society	24
5.1	Reasons for growth	24
5.1.1	Geographical characteristics	24
5.1.2	Demographics	25
5.1.3	Early adoption.....	25
5.1.4	Perceptions and attitudes.....	26
5.1.5	Contributing factors	26
5.2	Patterns in mobile use	26
5.3	Mobile phones and adolescents.....	28
6	Conclusion.....	29

1 Introduction

Norway currently ranks eleventh in the world in terms of mobile phone penetration levels and boasts one of the highest short message service (SMS) usage rates per capita in Europe. Its adoption rate of mobile telephony has been unprecedented, with the number of mobile phone subscriptions overtaking that of fixed-line subscriptions as far back as 1998.

Being one of the first countries in the world to launch commercial mobile services, Norway has also continued its tradition of introducing and adopting innovative mobile technology and services in its market today. It was the first country to launch a public WAP portal in November 1999 and the first to launch MMS services in March 2002. Above all, mobile use has pervaded Norwegian society in a profound way, affecting the way how people do business as well as how they lead their social lives.

This report aims to provide a broad overview of Norway's mobile market, its drivers as well as its societal aspects. Section two provides us with a brief background of the country, against which the Norwegian mobile society has developed. Section three then goes on to highlight some of the major characteristics of the Norwegian mobile market. Section four describes the legislative and regulatory background against which this takes place while section five goes on to look at some of the social aspects of mobile use in Norway.

2 Country background

2.1 Geography and demographics

Norway consists of the western and northern section of the Scandinavian Peninsula, as well as the arctic island archipelago Svalbard plus Jan Mayen (see Figure 2.1).

Including the Northern islands of Svalbard and Jan Mayen, Norwegian territory covers 386,958 square kilometers. The mainland stretches 1,752 km from the southern to the northernmost tip. The mainland coastline itself is 3419 km long (excluding fjords and indentations). At the country's widest point, eastern and western Norway are divided by a mountain range called Langfjellene. More than half of the country's total area lies above the timberline and only three percent of the territory is arable land.

Figure 2.1: Map of Norway



Source: CIA World Factbook.

Norway's population is 4,546,123 (July 2003 est.) giving it a population density of around 11.7 per km². The capital city of Oslo has 512,000 inhabitants. The age structure of the population is as follows: 0-14 years: 19.9 per cent (male 465,320; female 439,095), 15-64 years: 65.2 per cent (male 1,501,608; female 1,462,590) and 65 years and over: 14.9 per cent (male 281,554; female 395,956) (2003 est.). The population growth rate is 0.46 per cent annually.

Ethnically, Norwegians are predominantly Germanic, although in the far north there are communities of Sami who came to the area more than 10,000 years ago, probably from central Asia. In recent years, Norway has become home to increasing numbers of immigrants, foreign workers, and asylum-seekers from various parts of the world. Immigrants now total over 300,000 of whom some have obtained Norwegian citizenship.

Norwegian is the official language and the country has a 100 per cent literacy rate. Although the Evangelical Lutheran Church is the state church, Norway has complete religious freedom. Education is free through the university level and is compulsory from ages 6 to 16. Military service and training are required of every eligible male. Norway's health system includes free hospital care, physician's compensation, cash benefits during illness and pregnancy, and other medical and dental plans. There is a public pension system.

2.2 Political system

The functions of the King are mainly ceremonial, but he has influence as the symbol of national unity. Although the 1814 constitution grants important executive powers to the King, these are almost always exercised by the Council of Ministers in the name of the King (King's Council). The Council of Ministers consists of a prime minister — chosen by the political parties represented in the Parliament (*Storting*) — and other ministers.

Legislative power is held by the *Storting*, with 165 members elected from 19 counties (*fylker*) at four-year intervals by universal adult suffrage on the basis of a modified system of proportional representation. The *Storting* divides into an upper house (*Lagting*) and a lower house (*Odelsting*) by internal election, although it sits as a single body except when discussing new legislation. Elections are not possible outside of the standard four-year cycle.

Each *fylke* is headed by a governor appointed by the King in council, with one governor exercising authority in both Oslo and the adjacent county of Akershus.

The special High Court of the Realm hears impeachment cases; the regular courts include the Supreme Court (17 permanent judges and a president), courts of appeal, city and county courts, the labor court, and conciliation councils. Judges attached to regular courts are appointed by the King in council after nomination by the Ministry of Justice.

A public referendum in Norway in November 1994 resulted in Norway's deciding by a narrow majority to remain outside the European Union (EU). The rejection stemmed largely from concerns about the loss of sovereignty in political matters although it also involved concerns such as the loss of national control over resources such as fisheries. To a large extent, the country's enormous oil and gas wealth has provided a sense of economy security independent of membership of the EU. Nevertheless, Norway participates in a number of EU policy areas.

The cornerstone of Norwegian foreign policy has traditionally been close cooperation with NATO, the United States and its Nordic neighbours Sweden, Finland, Iceland and Denmark. While Nordic cooperation has been weakened slightly by Sweden and Finland's joining Denmark in the EU in 1995, cooperation remains strong and Nordic Ministers and officials meet regularly on a wide range of topics.

Norway has played an active and positive role in international security. It is a member of NATO, and has been an active peacekeeper. Norway has played a key role in mediating the Middle East Peace Process, and has also been involved in mediation efforts in Sri Lanka and Sudan. Norway was on the UN Security Council from 2000 to 2002.

2.3 Economy

In 2002, Norway was the world's third richest country in per capita terms. Its large shipping fleet is one of the most modern among maritime nations while metals, pulp and paper products, chemicals, shipbuilding, and fishing are the most significant traditional industries.

Norway is the world's third-largest oil exporter and provides much of Western Europe's crude oil and gas requirements. Current petroleum production capacity is more than 3.5 million barrels per day. Offshore

hydrocarbon deposits were discovered in the 60s, and development began in the 70s. The growth of the petroleum sector has contributed significantly to Norwegian economic vitality. Large sums of investment capital poured into the offshore oil sector, leading to increases in Norwegian production costs and wages than in the rest of Western Europe. The influx of oil revenue nevertheless permitted Norway to expand an already extensive social welfare system.

Unemployment remains low at 3.9 per cent (2002 est.) while GDP growth was 1 per cent in 2002 and 2003. Adjusted for purchasing power parity, GDP was US\$ 149.1 billion (2002 est.), which gives a per capita income of US\$ 33,000 (2002 est.).

Norway has been a member of the European Free Trade Association (EFTA) since the association's founding in 1960. As an EFTA member, Norway played an active role in the establishment of the European Economic Area (EEA) which came into force in January 1994, and which forges the EU and EFTA into a single trading block (with the exception of the agricultural and fisheries sectors)..

Through the EEA Norway enjoys free trade access to the EU market. Its chief trading partners are within the EU, principal export destinations being the UK, Germany, France, the Netherlands, and Sweden, while the main sources of imports are Sweden, Germany, Denmark and UK. In addition to oil and gas, significant export items include machinery, non-ferrous metals, fish, iron and steel, and ships and oil platforms. Major import items include machinery, transport equipment, manufactured goods, chemicals and food and drink

Norwegian monetary policy is aimed at maintaining a stable exchange rate for the Norwegian Kroner (NOK) against European currencies, of which the "Euro" is a key operating parameter.¹ Norway is not a member of the EU's Economic and Monetary Union.

2.4 ICT sector overview

In 2002, the Norwegian information sector employed 127 701 persons. Among these 86 863 were employed in the ICT sector and 40 838 were employed in the content sector. Employment in the ICT sector constituted 3.7 per cent of the total economy.²

In the same year, turnover within the information sector was NOK 243.4 billion and was divided between the ICT sector and the content sector by NOK 195.2 billion and NOK 48.2 billion respectively. From 2001 to 2002 turnover within the ICT sector was nearly unchanged. Turnover within the ICT sector comprised 6 per cent of the total economy (excluding the public sector), a figure that has remained unchanged for the past three years.

2.4.1 Telecommunications

Norway has one of the most advanced and extensive telecommunications networks in Europe. The telecommunications infrastructure in Norway consists of fixed telephony networks (fiber, coax and copper), wireless networks (both analogue and digital mobile), and cable television networks. This infrastructure covers the vast majority of the country and it is estimated that less than 0.9 per cent of the population do not have access to mobile or fixed communications networks (see Table 2.1). Universal coverage, nonetheless, is ensured by a domestic satellite system. Internationally, Norway is served by two buried coaxial cable systems; four coaxial submarine cables and a host of satellite systems - Eutelsat, Intelsat (Atlantic Ocean), and Inmarsat (Atlantic and Indian Ocean regions).

Key growth drivers of the telecommunications sector include increased competition resulting from market deregulation in 1998, the 100 per cent digitalization of main lines in the same year and consistently strong growth in the mobile sector in terms of subscriptions and traffic.

Table 2.1: Basic telecommunications indicators

	1995	1996	1997	1998	1999	2000	2001	2002
Cellular mobile telephone subscribers	981'305	1'261'445	1'676'763	2'106'414	2'744'793	3'367'763	3'759'862	3'840'377
Cellular subscribers per 100 inhabitants	22.46	28.71	37.95	47.38	61.29	74.78	83.11	84.36
Main telephone lines in operation	2'476'451	2'588'893	2'735'490	2'934'522	3'175'995	3'301'801	3'314'378	3'343'046
Main telephone lines per 100 inhabitants	56.67	58.93	61.92	66.01	70.92	73.32	73.26	73.44
Personal computers per 100 inhabitants	27.30	31.69	35.97	40.49	44.66	48.85	50.84	52.83

Source: ITU World Telecommunication Indicators Database.

2.4.2 Internet

Norway has had a long history of being connected to the Internet, hosting one of the first international connections to the then fledgling network. Along with the University College of London in the United Kingdom, the Norwegian Defence Research Establishment (NDRE) in Norway connected to ARPANET in 1973.

In 2003, two thirds of Norwegian households had access to a PC while more than half of the total number of households had access to the Internet. Around 40 per cent of the population report using the Internet at least once a day.³ In terms of broadband penetration, Norway had a penetration rate of 1.94 subscribers per 100 population in 2002.⁴

Internet usage in Norway has been sophisticated with seven out of ten users using the Internet for the sale and purchase of goods and services within a three-month period. More than half of all Internet users visited government websites during the same period. However, 21 per cent of the population also reported problems with computer viruses in 2002.

3 The mobile market

3.1 Evolution of the mobile market

Dating back to the early days of radio, Norway has long been a pioneer in the field of wireless communications. Norway was the first country in Northern Europe to deploy a wireless telegraph link in 1906. This was then followed by the arrival and installation of its first wireless (or radio) telephone sets in 1919.⁵

Manual mobile telephony services over VHF were introduced in Norway as far back as 1966.⁶ This was then replaced by an automatic analogue cellular system based on the Nordic Mobile Telephone (NMT) 450 standard, which appeared in 1981 (see Box 3.1). Due to its popularity, this network was supplemented by the NMT 900 version in 1986. Its digital successor, Global System for Mobile Communications (GSM), was introduced in 1993 while its less successful sibling, Universal Personal Telecommunications (UPT), was introduced in 1994.⁷ Norway launched its first Universal Mobile Telecommunication System (UMTS) network in 2001.

Box 3.1: The history of the Nordic Mobile Telephone (NMT)

The concept of cellular service is the use of low-power transmitters where frequencies can be reused within a geographic area. The idea of cell-based mobile radio service was formulated in the United States at Bell Labs in the early 1970s. However, commercial services were not feasible then as the necessary enabling technology did not exist. Instead, the first operational cellular systems were opened in the Scandinavian countries of Sweden, Denmark, Norway and Finland in 1981 with the introduction of an analogue cellular system known as NMT - the Nordic Mobile Telephone standard. This was the result of a ten-year development project that took the form of a cooperative venture by the telecommunication authorities in the Nordic region. The standard gained in popularity rapidly within the region as well as abroad.

NMT 450 was the first public, automatic mobile service that was launched in Norway in 1981. At its peak in 1996, there were more than 190,000 NMT 450 subscribers in the country. NMT 450 is currently due to be phased out by 31 December 2004 and its customer base is currently around 50,000.

Source: ITU.

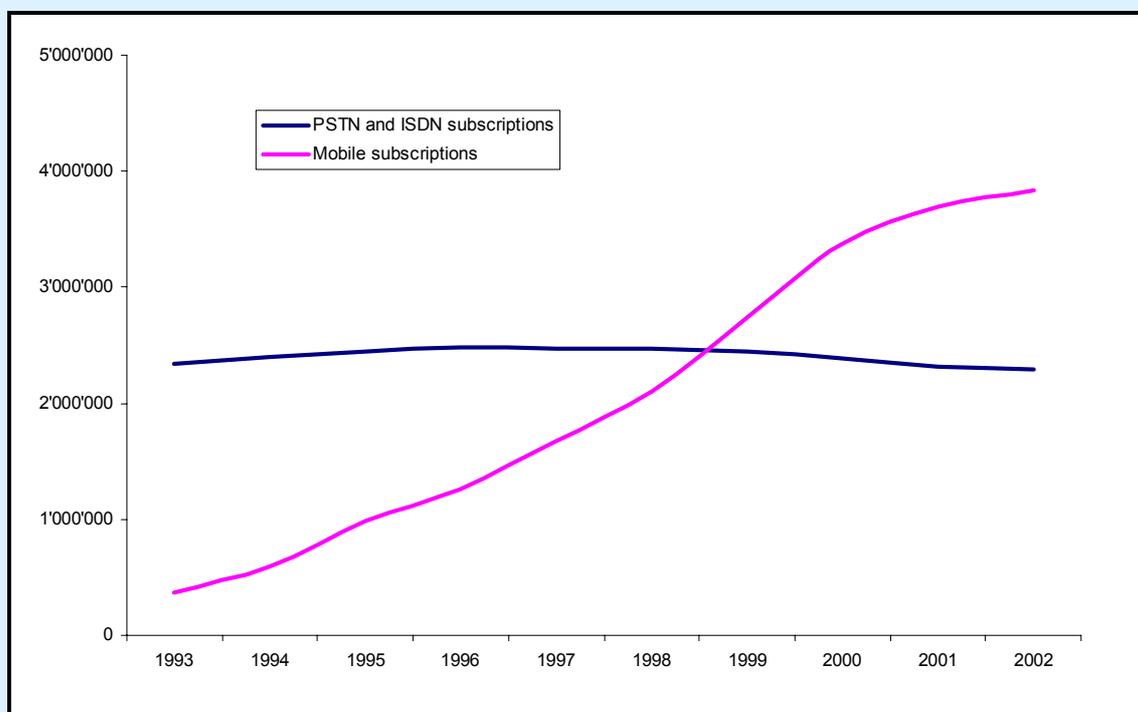
As far back as 1998, the number of mobile subscribers (including prepaid card users) in Norway overtook that of fixed line subscribers (see Figure 3.1). At year-end 2002, Norwegian mobile subscribers totaled 3,840,377, which translates into a penetration rate of 84.3 per cent with a compound annual growth rate of 53.6 per cent from 1995 to 2002.

3.2 Market trends

As highlighted in a recent report by the Norwegian Post and Telecommunications Authority (NPT) on the Norwegian telecommunications market, the growth in consumption for telecommunications services in general has been relatively constant over the past seven years.⁸ From 1996 to 2002, household spending on telecommunications services have increased by an average of 3.8 per cent per annum, thus contributing to the consistently high level of demand for telecommunications services by private individuals, particularly in the area of mobile services.

Figure 3.1: Mobile overtakes fixed

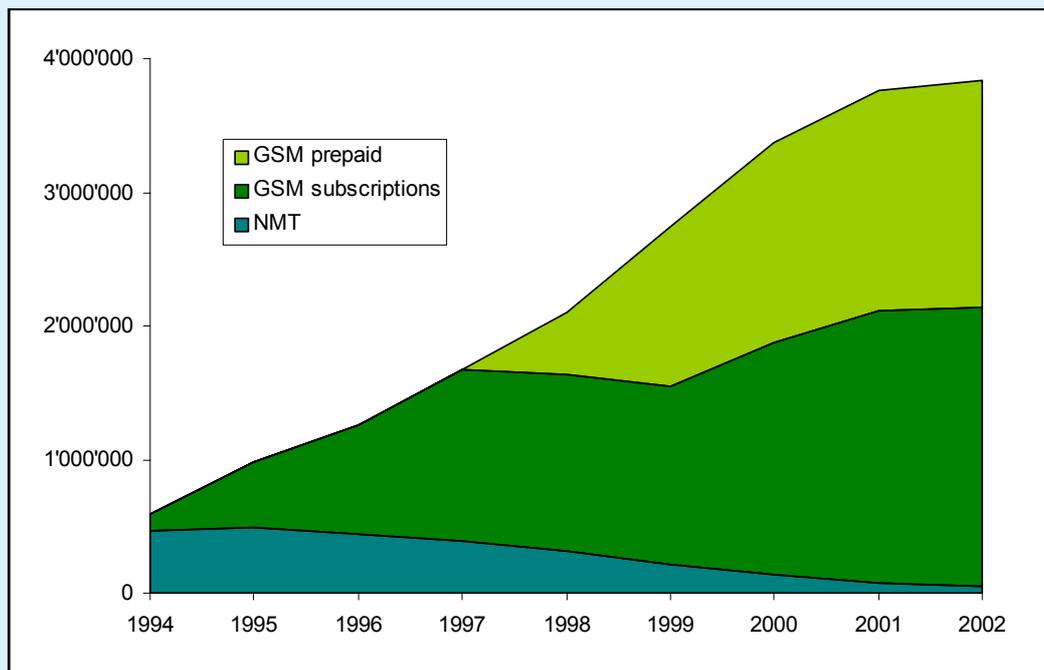
The growth of subscriptions for fixed line telephony and mobile telephony, 1993 - 2002



Source: The Norwegian Telecom Market 2002, NPT.

Figure 3.2: Growth in mobile subscriptions and prepaid sales

Growth in number of mobile subscribers and prepaid users, 1994 - 2002



Source: The Norwegian Telecom Market 2002, NPT.

Growth in the number of mobile phone subscriptions (including prepaid) has been strong since 2000 but has since slowed. This has largely been attributed to the saturation of the mobile market. As a result, the growth in network volume has become less of a preoccupation to providers as compared to traffic growth in the sector.

3.2.1 Mobile subscriber numbers

Mobile telephony subscriptions (including prepaid users) have increased steadily during the nine-year period between 1993 and 2002. Nevertheless, overall growth has slowed noticeably during the period between 1999 and 2002. Growth for subscriptions and prepaid cards totaled 30 per cent in 1999, 22 per cent in 2000, 10 per cent in 2001 and four per cent in 2002 (see Figure 3.2).

Since the introduction of prepaid cards in 1997, prepaid cards accounted for nearly all net growth in 1998 and 1999. Between 1997 and 2001, prepaid growth also outstripped that of subscriber numbers by a significant margin.⁹

3.2.1.1 Subscriber growth and technology

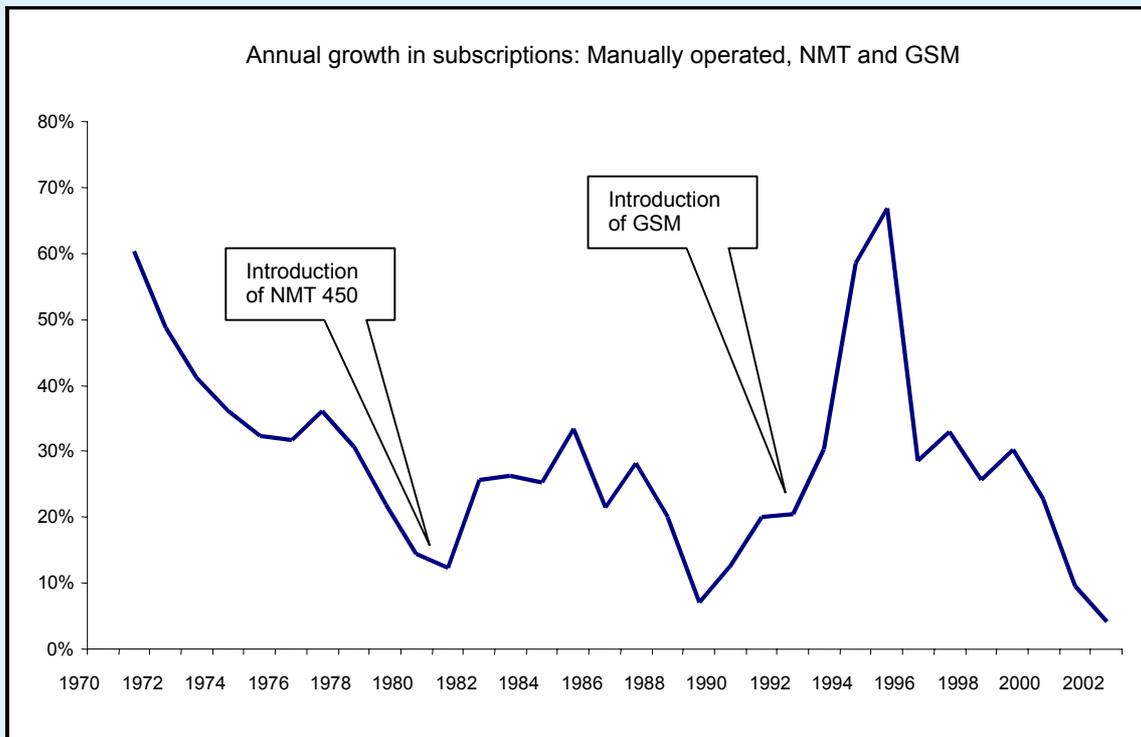
As a general observation, mobile subscriber growth rates have generally reflected the entry of new technologies into the market (see Figure 3.3). Adoption patterns typically follow the trend high initial growth rates followed by a gradual fall. This is illustrated by the growth curve of the manual mobile system between 1971 and 1981. The introduction of NMT 450 was followed by a second growth spurt, which subsequently tapered off until 1993 when GSM was introduced.

3.2.2 Mobile coverage

As illustrated in Figure 3.2 above, throughout the 90s there has been a strong customer transition from NMT to GSM. This matched to a certain degree the gradual expansion of the GSM network during that period to cover up to 99.2 per cent of the Norwegian population today. In 2001, NMT 900 was phased out and the licence held by Telenor Mobil for NMT 450 will expire on 31 December 2004. The NMT 450 service will be shut down at the same time.

Figure 3.3: Annual growth in mobile subscriptions

Annual growth rates in mobile subscriptions: Manually operated, NMT and GSM, 1971 –2002, percentage



Source: The Norwegian Telecom Market 2002, NPT.

In order to compensate for the loss of coverage resulting from the decommissioning of the NMT 450 service, the market incumbent Telenor Mobil has announced that it intends to significantly increase GSM coverage, particularly along the Norwegian coast. In many places signals will extend four times as far from land as today. Its general approach has been to double the reach offered by the old NMT 450 service so that there will be general GSM coverage as far as 60-70 kilometres from land. In some places the GSM coverage will be increased to as much as 120 kilometres from land. However, in such cases, due to the curvature of the earth maritime antennas may have to be placed high up on boats to receive a signal. Such extended cells will also be established at certain base stations in the Norwegian mountain ranges. Data transfer speeds on the network will also be increased significantly. The work will be concluded well in advance of 31 December, 2004.¹⁰

3.2.3 Mobile voice traffic

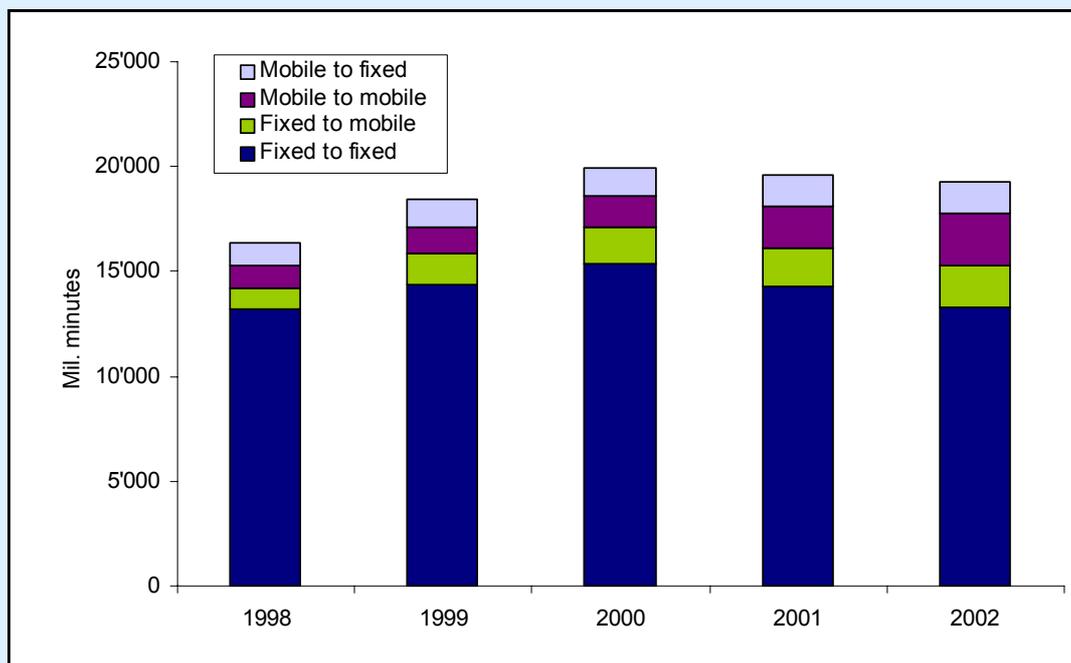
While there are more mobile phones in use than lines in the fixed network, the voice traffic originating in the mobile network is still very low compared to that in the fixed network. In 2002, approximately only a quarter of the voice traffic originated from mobile networks despite the fact that there were around 15 per cent more mobile phones than fixed lines.

In general, studies indicate that Norwegians have a tendency to only use mobile telephony when they are on the move, for example when they are outside the office and the home. Fixed line telephony remains the overall preferred mode of communication. This has largely been attributed to the fact that price levels for mobile telephony compared to that of fixed line telephony still remains high, with mobile telephony traffic prices being approximately three times more than that of fixed line telephony.

Nevertheless, growth in traffic from mobile phones has continued to grow, matching recent reductions in prices as well as the continued growth in private incomes. While relatively modest compared to the period before 2000, mobile network volume in terms of subscriber numbers has still continued to grow, contributing to an increase in mobile traffic.

Figure 3.4: Trends in fixed line voice traffic and mobile voice traffic

Volume of traffic, millions of minutes, 1998 - 2002



Source: The Norwegian Telecom Market 2002, NPT.

Although it will take some time before traffic in the mobile network surpasses that of traffic in the fixed line network, there is a relatively clear trend in that direction. Figure 3.4 illustrates the fall in fixed line to fixed line traffic with a corresponding growth in fixed to mobile traffic at a rate of approximately 10 per cent per annum over the last three years. Furthermore, overall traffic in the mobile network has shown a constant growth compared to that in the fixed network, which has been in decline since 2000.

In 2002, the Norwegian mobile subscriber talked for an average of 1'084 minutes. This represents an increase of 113 minutes in relation to the previous year.

3.3 The mobile commercial landscape

Competition was introduced early into the Norwegian mobile market with the licensing of NetCom to provide GSM services in 1991. However, the competitive environment of Norway's mobile market can still be described as highly concentrated due to Telenor Mobil's large share of the market. Nevertheless, because of increasing gains in market share by rival operator NetCom as well as the market entry of an increasing number of new service-based mobile operators, mobile telephony prices have been kept in check. Norway's mobile market is comprised of three GSM operators: Telenor Mobil, Netcom and Teletopia, who own their own networks. In addition, there are a number of service based providers who use either Telenor Mobil's or Netcom's networks. As at the end of 2003, there were 13 mobile service providers in the market.

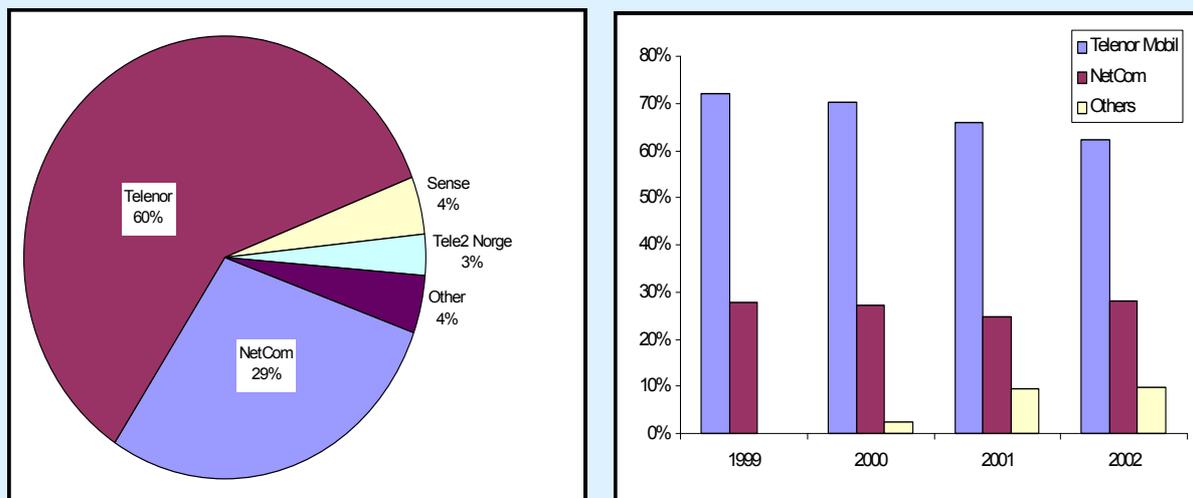
3.3.1 Market shares

Since the introduction of competition in 1993 with the entry of NetCom into the mobile market, the market share held by incumbent Telenor Mobil has been eroded gradually. In 2002, Telenor Mobil's share of market revenues for voice traffic stood at 62.2 per cent while its market share of subscribers stood at 59.7 per cent.

The introduction of a growing number of service-based mobile operators starting from 2000 has nevertheless transformed the mobile market in Norway considerably. These competitors have captured approximately 10 per cent of the market, primarily from Telenor Mobil (see Figure 3.5) within a three-year period. The dramatic influx of new competitors coupled with the introduction of mobile number portability in November 2001 led to a significant change in market shares during this period. In 2002 alone, seven per cent of mobile subscribers (258,000) changed operators.

Figure 3.5: Operator market share by subscribers and traffic

Breakdown of market shares by subscribers, 2002, percentage (left) and by mobile traffic from 1999 to 2002, percentage (right)



Source: The Norwegian Telecom Market 2002, NPT.

The launch of a price comparison service, “Telepriser.no”, in August 2002 by the NPT also appears to have contributed to the shift in market shares, significantly reducing the market share of the incumbent while prompting an increase in the number of smaller operators entering the market (see Box 3.2). A number of smaller operators have consistently been placed high on the price ranking results due to relatively lower subscription and traffic costs in general.

3.3.2 Mobile pricing and revenue

The affordability of mobile services is an important factor behind the country’s high level of mobile use. For example, the price of mobile services in Norway has been lower than the average of that charged in comparable countries within the OECD. In February 2003, it was ranked the tenth cheapest in terms of prices for mobile telephony for private use while it was ranked eight cheapest for business use among the OECD countries.¹¹

Box 3.2: Telepriser.no

Launched in August 2002 by the NPT, Telepriser.no is an online telecommunications pricing application that enables Norwegian citizens to compare telecom providers' prices over the Web. The user simply keys in personal usage patterns and a list of the best price plans are displayed. This free service makes price comparisons in fixed, mobile and Internet access plans.

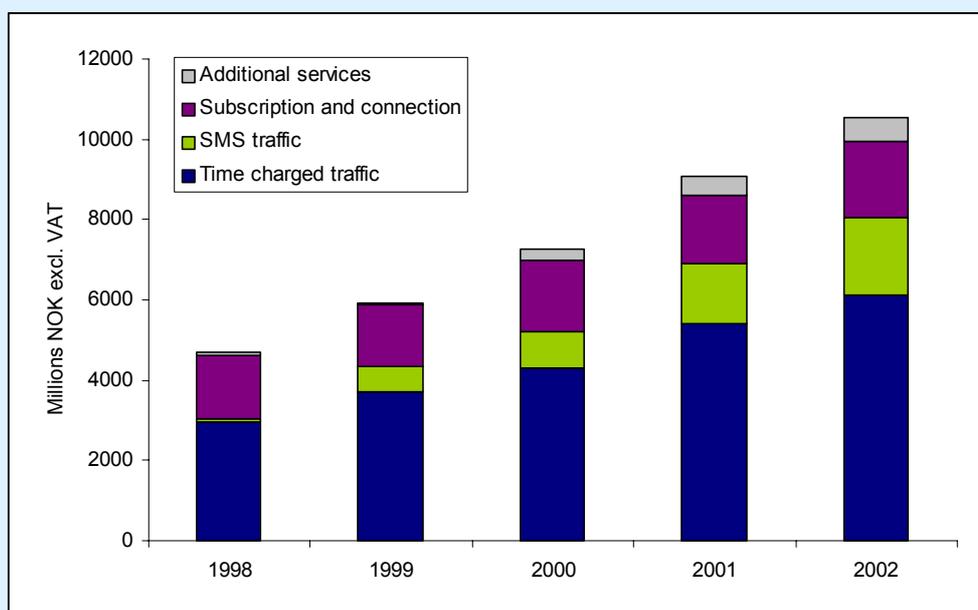
The site received 25,000 users the day of the public launch and had more than 180,000 hits within the first four months. At the end of 2002, a market survey was conducted to enquire into people’s familiarity with and use of the service. The survey showed, among other things, that 37 per cent of Norway’s inhabitants know of Telepriser.no, and that about 5 per cent of Norway’s inhabitants have used the service. It is estimated that around 60 per cent of the people who have used the service have changed providers.

To a large extent, the Telepriser.no’s service lowers barriers to entry into the telecommunications market, by eliminating the need for prohibitively expensive marketing and publicity on the part of smaller operators. Consumers are also able to do price comparisons without the need for extensive research. In this respect, results were seen just a short time after Telepriser.no’s launch with one small mobile operator doubling its subscribers within a month. Correspondingly, other operators appear to have lowered their prices to compete with the low price offerings of the new entrants.

Source: NPT; <http://www.telepriser.no/>.

Figure 3.6: Turnover for mobile services

Annual industry turnover for mobile services, NOK excluding VAT, 1998 - 2002



Source: The Norwegian Telecom Market 2002, NPT.

In general, price differences between mobile operators have been relatively small. While smaller service-based operators typically charge lower prices for mobile phone use as compared to the market incumbent Telenor Mobil and established operator NetCom, their prices have been ultimately constrained by the cost of using Telenor Mobil's or NetCom's facilities to carry their traffic. Termination charges have also acted as a further constraint on prices.¹²

As a whole, despite a slowdown in the growth of subscriber numbers, turnover figures indicate that mobile operators have generated increasing revenues from the growth in mobile traffic. Revenue generated from SMS traffic as well as from other value added services have also grown (see Figure 3.6).

As a result, mobile operators on average have enjoyed consistent growth in both the average revenue per minute as well as in terms of the average revenue per subscriber (see Table 3.1).

The strong growth in revenues indicates that prices for mobile service prices in Norway may still have some room for reduction. In fact, prices have already started to come down. Telenor Mobil, the market incumbent, lowered its prices significantly for business subscriptions in January 2003 and for mobile Internet services in February 2003.

Table 3.1: Average revenue per minute and per subscriber for mobile services, NOK

	1999	2000	2001	2002
Average revenue per min (NOK)	2.65	2.47	2.49	2.53
Average revenue per subscription (NOK)	2'536	2'250	2'493	2'779

Source: The Norwegian Telecom Market 2002, NPT.

3.3.3 Key operators

3.3.3.1 Telenor Mobil¹³

Telenor Mobil is the mobile services arm of Telenor AS, the successor of the former government telecommunications monopoly, Norwegian Telecom (or Televerket). The Norwegian Government is the major shareholder in Telenor AS, holding a 63.7 per cent interest in the company. This was recently reduced from 77.6 per cent after selling 13.9 per cent of the company for US\$1.03 billion in July 2003,

The Telenor group's interests span the entire range of communications services including fixed line, data, Internet and broadcasting. The group is divided into five units: Telenor Mobile, Telenor Nordic Mobile, Telenor Networks, Telenor Broadcast, the marketing unit Telenor Norway. Sales and marketing activities are coordinated in the Telenor Norway unit while the Mobile unit controls international mobile activities. The Telenor Networks unit encompass fixed line development and operations in Norway, and other international fixed line activities. Telenor Broadcast covers all TV activities, including content and interactive services.

Following its purchase of Comsat Mobile Communications in 2001, Telenor became the world's largest operator of mobile satellite services. Outside its holdings in Norway, the Telenor group also owns substantial holdings in around 13 international mobile operators including those in Hungary (Pannon), Malaysia (Digi), and Thailand (TAC). It also owns stakes in a number of Nordic region telecommunications infrastructure operators including cable TV operations.

Telenor's primary growth areas are in mobile communications and high-speed data services. Some of the new services it has launched include Wireless Zones, a secure wireless LAN solution for the business market (see Box 3.3).

Box 3.3: Wireless on the beach

The wireless workplace of the future is on display at the new seaside headquarters of Norway's telecommunications giant, Telenor. Leading by example, Telenor launched in 2002 what it claimed to be Europe's largest wireless workplace, stretching all the way to the sea.



Telenor's use of Wireless Zone technology, essentially a secure wireless LAN solution which it developed together with Cisco, Accenture and Birdstep Technology, is impressive both for its size and its accompanying level of integration with Telenor's office design and working practices. Staff are no longer assigned a fixed workstation and are instead expected to be mobile, setting-up their portable computers wherever they find a space, even if it is on the beach. Increasingly, an expectation is being built for staff to be online, all the time, wherever they are on the premises.

Source: *BBCNews* at <http://news.bbc.uk/1/hi/business/1917495.stm>.

3.3.3.2 *NetCom*¹⁴

Since its founding by Nordic conglomerates Nora, Kinnevik and Orkla in 1989, NetCom has grown to become Norway's second largest mobile operator after Telenor Mobil. NetCom is currently a 100 per cent owned subsidiary of the Swedish-Finnish company TeliaSonera, the merged entity of Sweden's incumbent operator Telia, and Finland's incumbent operator Sonera. Based on the number of customers, NetCom's parent, TeliaSonera, is the largest fixed line and mobile service provider in Sweden and Finland, and the fourth largest in Denmark. TeliaSonera also owns substantial holdings in mobile and fixed line operations in the Baltic region, including Lithuania and Latvia.

NetCom's core business is its GSM mobile operations in Norway, which it was granted a licence for in 1991. It is active both in the private and business segments of the mobile market, competing aggressively in terms of introducing comparable service offerings to those of the market incumbent Telenor Mobil. In some cases NetCom has been the first to market new mobile services, such as its introduction of GPRS in February 2001. Complemented by an extensive distribution chain, the company has been an effective competitor to the incumbent, having gradually captured more market share since its entry into the mobile market. At the end of March 2003, NetCom had 1.151m subscribers, up 63,000 from 2002.

3.3.3.3 *Tele2 Norge*¹⁵

Tele2 Norge has been present in the Norwegian telecommunications market since it was opened for competition in January 1998. Even before deregulation, Tele2 Norge operated as an ISP in the Norwegian market since 1997. Tele2 Norge is a wholly owned subsidiary of the Swedish company Tele2 AB, which has extensive holdings in numerous competitive telecommunications operators in Europe, particularly in the Baltic and Nordic region.

Tele2 Norge competes mainly in the fixed-line market with a market share of 13.5 per cent in terms of traffic in 2002, ranking second only to Telenor. To a large extent, Tele2 Norge's entry into the mobile market has been regarded as a strategy to position itself as a full telecommunications service provider in the Norwegian market. This strategy has resulted in significant gains through the cross selling of mobile services to Tele2 Norge's existing fixed-line customer base. Tele2 Norge also pursues a cross selling strategy with regard to its Internet access services.

In September 2002, Tele2 Norge signed an MVNO agreement to use Telenor Mobil's UMTS network for a five-year period. As part of the agreement, Telenor Mobil was allowed to use Tele2's UMTS network in Sweden. It returned its UMTS licence to the Norwegian authorities two months later, ending its commitments linked to the deployment of a UMTS network in Norway.

3.3.3.4 *Sense International Communications*¹⁶

Sense was the third company in Norway to offer mobile services, having launched its services in January 2000. It was also one of the first companies to pioneer the Mobile Virtual Network Operator (MVNO) concept of service provision. It currently has the third largest market share of the mobile market in Norway. Sense provides its mobile services over both Telenor Mobil's and Netcom's radio networks and allows its customers a network choice option. Although it uses Telenor Mobil's and Netcom's base stations, Sense operates its own core network of switches as well as performs its own customer billing and administration functions.

Sense is wholly owned by the ReitanGruppen, a family-owned conglomerate that owns some of Scandinavia's largest food service retail chains. In Norway, they control the Rema 1000 and Narvesen chains. Narvesen is the leading player in the kiosk and convenience trade in Norway. These outlets provide Sense with an extensive nationwide distribution network for its services.

3.3.3.5 *Teletopia*¹⁷

Teletopia was established in 1994 as the fourth telecommunications operator in Norway at that time. Capitalizing on its corporate history as a manufacturer of intelligent network (IN) systems, its original focus was on IN services, such as premium rate services, voice mail and other similar services based on number translation. Despite some difficulty in obtaining access to Telenor Mobil's network, Teletopia entered the SMS-services market in 1998. It was particularly successful in providing SMS-based interactive TV solutions for the two major Norwegian broadcasters. Currently, Teletopia is the third facilities-based mobile

operator in Norway, after receiving a GSM licence in 2001 to build out its own network. Consequently, it has deployed a GSM network in the Oslo area and has started to offer mobile services from October 2003.

Teletopia's strategy is essentially to focus on dense population centers in Norway. While it is unable to secure a national roaming agreement with the other network operators, it nevertheless aims to compete with these operators on the basis of a strategy combining low pricing and the offering of new innovative value-added services that leverage on its ability to tailor its network equipment and software.

3.4 Mobile data services

Norway has had a long history of being among the first in introducing innovative new services in the mobile arena. For example, the development of mobile data services across all platforms (2G, 2.5G and 3G) has been a predominant focus of market incumbent Telenor Mobil's strategy to increase revenues and to maintain market share in the face of stiffening competition. To a large extent, this has prompted its competitors, particularly NetCom, to introduce a similar host of services.

In partnership with a wide range of content developers and other services, Norway's two major mobile operators offer a host of value-added mobile data services.

3.4.1 Short Messaging Service (SMS)

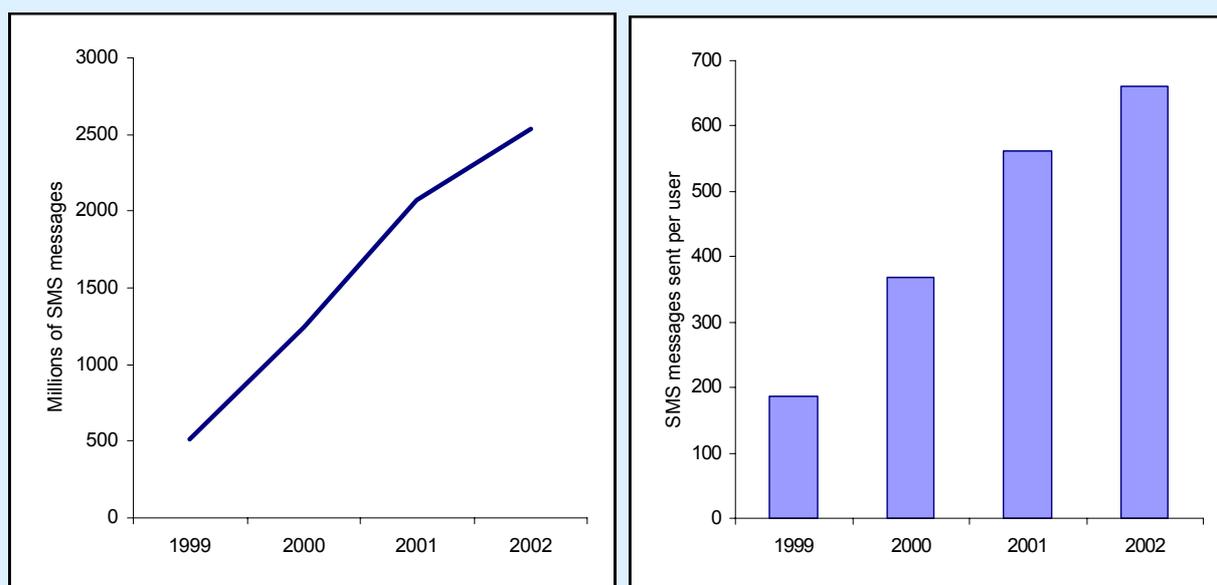
3.4.1.1 The growing popularity of SMS

The current high level of SMS use in Norway and its consistent growth since its introduction is a hallmark of Norway's mobile information society. The Norwegian mobile subscriber is on average the most intensive user of SMS services (both person-to-person or P2P SMS as well as Premium SMS) among the Nordic countries and one of the most intensive in Europe. In 2002, each Norwegian mobile subscriber sent an average of 661 SMS messages. This was double the average number of messages sent by Norwegian mobile subscribers in 2000 (see Figure 3.7).

In terms of growth, the number of SMS messages sent increased steadily during the three-year period from 1999 to 2002. From 2000 to 2001, SMS messages sent increased by 830 million while from 2001 to 2002, 470 million more messages were sent. The average price of an SMS is less than NOK 0.70.

Figure 3.7: Growth in SMS traffic

Growth in SMS traffic, 1999 – 2002, millions of SMS messages (left) and growth in average number of SMS messages sent per user per annum, 1999 – 2002 (right)



Source: The Norwegian Telecom Market 2002, NPT.

Box 3.4: Types of Premium SMS

There are essentially two main types of Premium SMS: mobile originated (MO) and mobile terminated (MT). In the case of the former, the service is charged to the mobile phone user who sends the message. In the case of the latter, the service is charged to the mobile phone user receiving the message. The type of technology deployed has a direct consequence on the kind of premium services that can be launched. For example, MO is ideal for offering interactive services which involve users sending information such as TV voting, Chat and Dating Services, Competitions, etc. while MT is ideal for content delivery such as logos or ringtones and subscription based services such as News Alerts, Horoscopes, etc.

Source: *Netsize - SMS Guide* at <http://www.netsize.co.uk/>.

3.4.1.2 Premium SMS

In Norway, the basic SMS text service has evolved in recent years as a platform to deliver a whole host of different services and to provide a degree of interactivity that is easily accessible to the public. Premium SMS services were introduced in April 2000 and have since gained in popularity rapidly. Although premium SMS services constitute less than five per cent of the total volume of SMS messages sent in Norway, they represent around 20 to 30 per cent of overall revenues from SMS services on average. Typical prices for Premium SMS range from NOK 4 to NOK 30.

From the initial launch of Premium SMS services, mobile operators in Norway have offered the full range of mobile originated (MO) and mobile terminated (MT) Premium SMS services. By installing the capability to offer MO and MT Premium services early, Norwegian mobile operators were able to offer a wide range of Premium SMS services to their subscribers far sooner than operators in most other countries (see Box 3.4). For example, MT billing was only introduced in Sweden more than a year later.

3.4.1.3 Factors influencing SMS usage

Although pioneered in the Nordic region in general, Norway's level of SMS use far surpasses that of its neighbours. Almost four times as many SMS messages per capita are sent in Norway than in Sweden while Denmark's SMS traffic volume hovers at around two thirds of that of Norway's.

A number of factors, both commercial and social, have been advanced to explain Norway's high level of usage of SMS based services, both P2P as well as Premium. In terms of the former, initial take-up of SMS services was fuelled by a long introductory period (around a year) where sending SMS messages was free of charge. Furthermore, Norwegian mobile operators have continued to market SMS services continuously, particularly through reduced pricing schemes and advertisements aimed at the youth segment.

Mobile operators in Norway have also made a conscious effort to price P2P SMS lower than the price of a one-minute call.¹⁸ The pricing of SMS, however, does not appear to be a determining factor in terms of SMS use. Despite mobile operators in Denmark charging significantly less for sending SMS, it still has a lower volume of SMS traffic per capita than Norway.

It is interesting to note that sending and receiving P2P SMS messages appear to be perceived as more socially acceptable than receiving voice calls on mobile phones when in the presence of company. During meetings in particular, communicating via SMS with external parties is regarded as less disruptive than taking a voice call.

In terms of Premium SMS, Norway's high use of P2P SMS enabled the easy adoption of Premium SMS when it was introduced. Furthermore, the introduction of both MO and MT Premium SMS services provided mobile users with a wide range of services from the very beginning. Content for premium services was also developed and deployed more easily due to the cooperation between Telenor Mobil and NetCom with regard to pricing and technical interfaces.

Interestingly, mobile operators have also noted that Premium SMS services generate their own marketing publicity through constant exposure by the mass media, in particular through TV and Radio shows. This exposure has also led to a greater familiarity with P2P SMS among mobile phone users.

3.4.2 General Packet Radio Service (GPRS)

In January 2001, NetCom was the first to introduce GPRS services to the Norwegian market. Telenor Mobil followed very closely, launching a subscription free GPRS offering the same month. In February 2002, NetCom's parent TeliaSonera launched an innovative GPRS roaming service across the Nordic region, which included NetCom's GPRS network.

Pricing for GPRS services has been aggressive with NetCom and Telenor charging some of the lowest prices per kilobyte in Europe. For example, Telenor Mobil's subscription free entry-level private GPRS offering charges NOK0.1 per kilobyte up to 0.5 megabyte and NOK0.015 per kilobyte after that. This is approximately four times lower than prices charged by mobile operators in Germany for similar subscription free offerings.

Nevertheless, the take up of GPRS data services has been modest with its use being spurred mainly by the WAP and MMS services over GPRS.

3.4.2.1 Wireless Application Protocol (WAP)

In November 1999, Telenor Mobil launched the world's first public WAP portal, DJuice. Following its launch, adoption and usage of WAP in Scandinavia in general has been comparatively high as compared to that in other European countries. Compared against initial forecasts, however, the usage of WAP services following its launch has remained largely subdued in Norway. Nevertheless, Norway appears to have witnessed an upswing in the popularity of WAP last year with access numbers being measured in the millions. In 2002, there was a core group of around 9,000 users who accessed WAP portals on a daily basis.

Essentially, the two major mobile operators in Norway have valued WAP as an experimental springboard from which future 3G services can be designed. The promotion of WAP is also regarded as an avenue to sensitise mobile users to the eventual introduction of 3G services.

3.4.2.2 Multimedia Messaging Service (MMS)

Telenor Mobil was the first operator in the world to launch MMS services when it introduced the service in March 2002. Since then MMS use in Norway has skyrocketed with around 2 million MMS messages sent over the summer in 2003. 160,000 SMS messages were sent in May, 550,000 in June and 1.35 million in July making Norway the leading MMS country in Europe during that period.

Currently, NetCom has reported more than 15 per cent of its customer base subscribing to MMS. At its peak, its subscribers sent 60,000 MMS messages in a single day alone.

To a significant extent, the MMS explosion has been driven by an extremely long period of free use offered by the two major operators, Telenor Mobil and NetCom, which was extended until November 2003. Undoubtedly, the take up of MMS services in Norway have also been boosted by the existing SMS intensive customer base. The launch of MMS services also coincided with the launch of new handsets by manufacturers in the Nordic region, which ensured a high level of media attention on the new service. Furthermore, the delay in the introduction of 3G services also created a certain amount of pent-up demand for newer interactive service offerings.

In general, operators in Norway have made a strong push towards achieving an early critical mass of MMS users in the market, providing a long period of free MMS use (similar to their successful introduction strategy of SMS services) as well as providing greater subsidies for MMS capable mobile handsets.

3.4.3 Universal Mobile Telecommunications System (UMTS)

In November 2000, four UMTS licences were assigned via a beauty contest, which netted the Government total proceeds of USD 64.5 million. Licences were awarded to Telenor Mobil, NetCom, Tele2 Norge and Broadband Mobile. In September 2001, Broadband Mobile's licence was revoked when the company filed for bankruptcy while Tele2 Norge returned its licence to the government in November 2002 after securing MVNO access to Telenor Mobil's UMTS network. Following a subsequent tender of the two vacant licences, Hi3G Access was awarded a UMTS licence in September 2003.

Under the original licensing conditions, licensees were required to launch their 3G networks by 31 December 2001. The rules originally required licensees to rollout their networks in specific areas that equated to around 40 per cent of the population. Accordingly, the NPT required existing licence holders to provide 3G coverage to 90 per cent of the people in each of the following populated areas within five years of service

launch: Greater Oslo, Bergen, Stavanger/Sandnes, Trondheim, Fredrikstad/Sarpsborg, Porsgrunn/Skien, Drammen, Kristiansand, Tromsø, Tønsberg/Åsgårdstrand, Sandefjord and Bodø. In addition to these roll-out obligations, NetCom and Telenor Mobil also made individual 3G population coverage commitments to the regulator in their licence bids.

Pursuant to the second tender, rollout terms were relaxed for the new entrant Hi3G Access as well as for existing licensees. Hi3G Access is only expected to achieve 30 per cent population coverage within six years of launch while a 15-month deadline extension for the existing licensees, Telenor Mobil and Netcom was granted.

NetCom and Telenor Mobil launched a small-scale trial network in Oslo in December 2001 in accordance with their licence conditions, however, commercial services are expected to be launched by Telenor Mobil at the earliest in the third quarter of 2004 while NetCom intends to launch its 3G services in the first quarter of 2005. The speed with which services would be adopted, once commercially launched, depends to a large extent on the availability of handsets, as well as quality and functionality of the first phones, factors which are have so far hindered the launch of UMTS networks in Norway.

3.5 Mobile content

Across the board, mobile operators have remarked that mobile content services provide significantly less of a margin than voice telephony services. On average, content services contribute less than five per cent to an operator's total average revenue. Nevertheless, they are recognised as having significant strategic value. Content services such as Premium SMS TV voting or televised chat generate a large amount of publicity for mobile services. In addition, they also serve to increase mobile phone familiarity and usage. At present, familiarising the consumers with non-voice services delivered over mobile phones is hoped to eventually pave the way for an increased take-up of 3G services as they become available.

To a certain extent, content services offered by Norwegian mobile operators do not differ greatly from those offered elsewhere around the world. The usual array of ringtones and logos as well as games can be found in the Norwegian market. What perhaps has distinguished the mobile content industry in Norway from most others has been the rapid time to delivery of innovative mobile services as well as the close cooperation between mobile operators and content developers across a wide range of industries.

Early content offerings based on SMS include the MobileInfo service launched by Telenor Mobil in 1997 which allowed mobile users to locate news, stock quotes, weather and telephone numbers as well as to conduct chat sessions and to send and receive e-mail. Despite the introduction of more sophisticated services, traditional SMS services such as directory inquiries and income tax return searches have remained the most popular mobile content services available.¹⁹ Mobile banking, as well as micro payments via SMS, have also proven popular among mobile phone users.

Norway has also taken the lead in introducing SMS services to the corporate segment, a previously untapped market for SMS services. In January 2002, Telecom Mobil's users were able to send SMS messages from their PC through Microsoft Outlook and Lotus Notes, without having to access the company's Internet SMS facility.²⁰ Mobile operators are also currently witnessing a strong increase in the take-up of corporate SMS services offering the mass-distribution of SMS messages.

Despite the limitations of what is increasingly considered as a dated technology, Norwegian operators have nevertheless managed to consistently expand their range of SMS-based services with new and innovative applications outside the traditional fields of mobile commerce (see Box 3.5 for a recent example).

Box 3.5: SMS turns mobile phone into an airline ticket

Telenor Mobil and Norway's local airline company "Norwegian" have entered into a partnership that enables customers to order and purchase air tickets for "Norwegian" flights via their mobile handsets. A world first, customers will be able to find, book and pay for tickets through SMS messages. More importantly, their receipts, which are issued in the form of SMS messages can be used as valid tickets for passengers to check-in.

The partners in this venture have described the initiative as both a cost-saving measure as well as a value-added service for mobile subscribers, who are increasingly turning towards mobile commerce solutions in Norway.

Source: *Telenor press release, 1 Sep 2004 at <http://www.telenor.no>.*

Box 3.6: Content Provider Access (CPA)

The two major mobile operators in Norway have standardised CPA agreements to which content developers or other parties seeking to provide content services can access their networks. By entering into a revenue sharing CPA agreement, the content provider is given a four-digit access number from which content requests can be received. The mobile operator takes care of all billing and payment arrangements.

Content providers can choose for themselves the price of individual services, however, there is an upper limit of NOK 30. Mobile subscribers are billed by debiting their prepaid card or mobile phone bill. Under the CPA agreement, 25 per cent of revenues generated go to the content provider while the operator retains the remainder.

Although simple, it is nevertheless important to note that this arrangement is not embraced as a perfect solution by many content providers who feel that they deserve a larger share of the proceeds coming from the sale of their content. The strong cooperation between Telenor Mobil and NetCom in this respect has made the task of negotiating for a higher per centage of the proceeds very difficult.

Nevertheless, changes may be imminent with digital content providers banding together to form a forum in order to gain a stronger negotiating position. "Inholdsnett" is a forum for suppliers of digital content in Norway and it includes most of the main players in the Norwegian media market. The stated purpose of the forum is to safeguard the market related terms and conditions for content suppliers on future digital networks.

Source: ITU.

Mobile operators in Norway have also launched a wide range of products that go beyond SMS technology. These include location-based services such as taxi dispatch services as well as a number of electronic products that can be delivered over wireless data transmission. For example, in the field of entertainment, Telenor Mobil has recently announced the launch of a full-scale service for downloading of music to mobile phones, being one of the first operators in Europe to launch the service. Telenor Mobil's WAP portal will carry overviews of all the available music services, which currently includes the titles of around 300 individual songs. All songs are cryptographed with Digital Rights Management (DRM) and cannot be transferred to other phones without the original SIM card used for downloading.²¹

As a whole, the two major operators Telenor Mobil and NetCom have demonstrated a high level of openness and cooperation between themselves regarding content delivery, particularly in respect to technical interfaces and pricing. Significantly, they have establishing a common approach with regard to network access arrangements with content developers and aggregators (see Box 3.6).

The eventual entry of UMTS operator Hi3GAccess into the Norwegian mobile market, however, will present a challenge to the existing arrangements developed for content provider access. With Hi3GAccess pursuing a walled garden approach to content development and distribution, the cooperation between Telenor Mobil and NetCom in the form of their open content provider access framework may have to be revisited.

3.5.1 Broadcasting

Premium SMS has become a huge success in Norway, particularly in the field of radio and television broadcasting. Established Premium services such as televised SMS chat and SMS voting have proven extremely popular. For example shows such as "Idol", televised by Norwegian broadcaster TV2, received more than 2.5 million votes through Premium SMS.

In this light, broadcasters have started to dedicate substantial resources to take advantage of this phenomenon. The national public broadcaster, NRK, for example, created a department of developments in 2002 to look into unconventional projects that included, predominantly, mobile-based services.

A number of new broadcast related SMS and MMS based services have been launched in Norway over the past few years. Examples include the televising of the first MMS chat feature in Europe (see Box 3.7), the publication of news and pictures submitted by viewers through MMS as well as the world's first televised positioning of SMS voting.²²

Beyond premium SMS and MMS services, Norwegian broadcasters are currently exploring the delivery of TV content over mobile phones in the form of video clips over GPRS initially and then over UMTS. The delivery of analogue TV over mobile phones is also currently under study.

Box 3.7: Svisj, let the viewers decide

In Spring 2002, NRK introduced a televised programme, Svisj, allowing viewers to vote on the music video to be telecasted. It also allowed viewers to chat with other viewers on-screen as well as to participate in ongoing polls.

In July 2003, MMS was introduced into the programming, allowing photographs sent by MMS to be televised. The introduction of this services further boosted volumes of SMS-based onscreen chat.



Source: NRK at <http://www.nrk.no/>.

3.5.2 Publishing

Newspaper publications in Norway have established themselves as one of the most successful sales channels for Premium SMS services, ranking above TV, radio and the Internet.²³ While the sale of news feeds, stock quotes and other information via SMS has been relatively insignificant, the sale of ringtones, logos and games and services offering live football scores and directory inquiries advertised via print and online newspaper mediums has proved highly successful for publishers who also own the content. Advertisements for these in-house SMS-based services have a daily presence on newspapers such as VG, Norway's highest ranking newspaper in terms of readership in both published and online print versions. In terms of non-print revenue, online advertising remains VG Multimedia's primary revenue stream. Nevertheless, mobile products generate around 15 per cent of its revenues.

Most newspapers in Norway also have WAP portals that complement their printed editions. These services have proved relatively popular with VG, for example, reporting more than 100,000 unique phone number visits monthly.

Besides leveraging the commercial possibilities of mobile services for revenue generation, the growing popularity of MMS services have also spurred some newspapers to encourage mobile users to act as impromptu reporters, urging them to send in pictures and stories of interesting events as they happen. In some cases, these are updated live on online versions of the newspaper.

3.6 Wireless LAN

The deployment of wireless LAN infrastructure in Norway has expanded considerably in Norway over the last few years with a number of ISPs turning to wireless LAN networks to distribute their services. Local network providers like WAN Norge have deployed extensive wireless access zones using technologies developed for licence-exempt spectrum to provide IP services for both business and residential use.²⁴

Wi-Fi hotspots have now been established at a large number of public areas including airports, hotels, cafés and even petrol kiosks (see Box 3.8).

Box 3.8: Filling up on fuel and e-mail

Norway's largest petrol station chain, Statoil, is the only station in Europe equipped to offer wireless access to its customers. In a team-up with Telenor, the new service was introduced last year in the aim of giving Statoil a competitive advantage over other petrol station chains.

Around 300 Statoil stations throughout the country now offer secure wireless access. These stations represent Statoil stations in Norway that are in range of Telenor's DSL service. Boosted by unexpected demand, however, Statoil, is now considering deploying hotspots to the additional 500 stations located elsewhere in Scandinavia.

Source: *Telenor Press release, 3 July 2003 at <http://www.telenor.no>.*

4 Mobile regulatory framework

4.1 Ministry of Transport and Communications²⁵

Communications and transport policy is formulated by the Ministry of Transport and Communications. It prepares material for the *Storting*, including the government budget and revisions, proposals for laws and amendments as well as strategic plans for the communications and transport industry. It also manages a number of administrative bodies and enterprises for which it has been tasked to oversee. These include, for example, the NPT, the Norwegian Railway Inspectorate, the Civil Aviation Authority, the Accident Investigation Board, the Norwegian National Rail Administration and the Public Roads Administration. It also oversees the operations of five State-owned companies: Norway Post, Norwegian State Railways, Flytoget AS, Avinor AS and Mesta AS.

4.2 Norwegian Post and Telecommunications Authority (NPT)²⁶

The telecommunications regulatory framework is managed by the Norwegian Post and Telecommunications Authority or Post og Teletilsynet (NPT). The NPT is a separate and autonomous administrative body under the Ministry of Transport and Communications with responsibility for administering legislation and implementing regulations in the area of post and telecommunications. Its work is largely financed by fees and charges. It employed 174 staff at the end of 2002.

The NPT was established in 1987 (then as the Norwegian Telecommunications Authority) as a prelude to the eventual deregulation of the Norwegian telecommunications market and the privatization of Norwegian Telecommunications, the government owned telecommunications provider. On January 1998, the Norwegian market for telecommunications was opened for competition. From that period onwards, more regulatory powers were progressively assigned to the NPT. In June 1997, the NPT was also assigned the task of regulating the postal industry in Norway.

Pursuant to the instructions laid down by the Norwegian Ministry of Transport and Communications on 30 May 1997, the PT's principle mission is to:

- Secure end-users access to high-quality basic postal and telecommunications services at reasonable charges by promoting effective competition in the postal and telecommunications markets;
- Follow up and develop national frequency plans, co-ordinate Norwegian frequency planning with the international efforts, award frequencies and monitor that the use of frequencies in Norway conforms with the requirements;
- Verify that the sale of radio and telecommunications equipment in Norway complies with the legislation in force, that the equipment is correctly used, and that it satisfies the requirements laid down nationally and internationally;
- Carry out the national standardization work in the postal and telecommunications sector and collaborate with international standardization organizations;
- Act as a proactive adviser to the Ministry of Transport and Communications on issues arising in the areas of postal services and telecommunications.

4.3 Key legislation and regulations

As an EFTA state party to the EEA, Norway implements the principles applicable to the provision of telecommunications networks and services under the EEA regulatory framework. The telecommunications policy of the EU, which forms the background for the EEA regulatory framework, is based on three elements: De-monopolization, liberalization of services and equipment, harmonization of and open access to networks and services, and the application of general competition rules. The European Commission (EC), the European Parliament and the European Council have issued a number of directives to that effect.²⁷

In 2003, Norway adopted an Electronic Communications Act, which incorporates to a large extent the new regulatory package for electronic communications networks and services adopted by the European Parliament and Council of Ministers in February 2002. Replacing the Telecommunications Act of 1995, the Act's stated purpose is to secure good, reasonably priced and future-oriented electronic communications services for users throughout the country through the efficient use of resources by facilitating sustainable competition, as well as stimulating industrial development and innovation. To achieve this aim, the Act provides the Authority a wide range of powers over providers designated as having significant market power (SMP). These can include obligations related to access, interconnection, co-location, and infrastructure sharing. The Act also deals with universal service obligations and spectrum management.²⁸

Key regulations promulgated by the NPT include the Regulations On Public Telecommunications Networks And Public Telecommunications Services (1997), Numbering regulations (1997) and Authorized frequency Use (2000).

4.4 Key decisions

The NPT has had to intervene in the mobile market in a number of instances to resolve various disputes involving mobile operators or to make regulatory decisions. The key motivation behind these interventions has been to encourage the growth of healthy competition in the mobile marketplace as well as to protect consumer interests. This section highlights some of these interventions.

Prior to launching its services in 2000, Sense sought entry into the mobile market as a service-based provider by using Telenor Mobil's network. Following the refusal of Telenor Mobil, Sense requested mediation and the NPT ordered Telenor Mobil to enter into negotiations to set the terms of Sense's access to its network. Although access was secured, the NPT was nevertheless approached to mediate again between Sense and Telenor Mobil regarding the terms of its resale agreement. In October 2002, Telenor Mobil was ordered to lower its resale rates by 25 per cent among other requirements.

In 2000, the NPT mandated cost orientation for interconnection rates levied by operators with Significant Market Power (SMP) in the national interconnection market.²⁹ In May 2001, the NPT resolved a dispute relating to termination rates by SMP operator Telenor Mobil, resolving that prices would have to be lowered from NOK 0.95 to NOK 0.78 per minute.

In July 2001, the NPT ordered Telenor Mobil to provide Teletopia with access to its mobile networks. Unlike service providers who lease network capacity from Telenor Mobil and NetCom, Teletopia planned to add its own equipment to the existing network infrastructure, with the result that it would be able to operate virtually independently of Telenor. Teletopia wanted a special network connection so that it could supply SMS services based on its own equipment. In April 2002, NPT received a joint mediation request from Teletopia and Telenor Mobil regarding the terms and conditions governing Teletopia's SMS-C access to Telenor Mobil's network. Following mediation, the NPT announced in October 2002 price terms and conditions and a number of other key contractual terms.

As part of its continuing policy of monitoring the mobile market for market imperfections and as a result of operator complaints regarding NetCom termination rates, NetCom was found by the NPT in May 2003 to have SMP in the national interconnection market. As such, NetCom was subject to cost oriented termination charges. Following this development, on June 2003 the two major operators published a glide rate to reduce their termination rates gradually. Telenor Mobil undertook to reduce its termination charges by NOK 0.05 before January 2004 while NetCom reduced its termination rates by NOK 0.10 to NOK 1.01 in July 2003 and undertook to reduce its rates by a further NOK 0.10 by January 2004. As a result of the lowering of NetCom's termination rates, Telenor Mobil announced that it would reduce end user prices as a result of NetCom's reduction in termination charges. It has been observed that in effect, this announcement has introduced a dynamic between lower termination rates and lower end-user rates.

In addition to direct intervention, the NPT has also resorted to a more “light-touch” approach to overseeing the mobile market. In the area of consumer protection, for example, NetCom’s practice of charging for voice services in 15-second blocs was discouraged through the use of media exposure and condemnation of the practice instead of through direct intervention based on regulations mandating transparent pricing.

The NPT has also been seen as a keen promoter of competition in the UMTS market through the introduction of more liberal market entry policies. Taking the advice of the NPT, the Norwegian Government has decided to allow MVNOs access to UMTS networks as well as to allow network sharing between the UMTS operators in order to fulfill their rollout requirements.

4.5 Health and mobile use

In promoting a conducive mobile market environment for the benefit of consumers, the Norwegian Government has also paid considerable attention to the health aspects of mobile phone use. This activity is largely monitored through the work of the Norwegian Radiation Protection Agency (NRPA).³⁰ The NRPA is the competent authority in the area of radiation protection and nuclear safety in Norway. Established in 1993, its tasks include overseeing the use of radioactive substances and fissile material, coordinating contingency plans against nuclear accidents and radioactive fallout, monitoring natural and artificial radiation in the environment and at the workplace and studying the occurrence, risk and effects of radiation. The organization is overseen by the Ministry of Health and Social Affairs.³¹ In the field of mobile telephony, the NRPA sets strict limits for electromagnetic fields in the case of antennae installations, which are reflective of World Health Organization (WHO) standards.

On 4 April, 2003, a report on mobile telephony and health was released by the NRPA.³² For the preparation of the report, an expert group was convened to examine the health effects associated with the use of mobile handsets. Although the report concluded that there were no evident health risks associated with the use of mobile handsets or from staying in close proximity to cellular base stations, the expert group could not rule out completely the possibility that adverse health effects could still occur. Consequently, users, in particular children and youth, were cautioned to limit exposure.

Ongoing research in the field of mobile telephony and health is ongoing at the NRPA and the Norwegian Institute of Public Health.³³ In addition to government safeguards, major mobile operators like Telenor Mobil have also in-house groups or individuals that monitor international research on this issue.

5 The mobile information society

5.1 Reasons for growth

Technological innovation and early adoption has been a distinguishing characteristic of the Norwegian telecommunications market since the introduction of the first wireless telegraph in 1906. Nevertheless, it is generally acknowledged that a host of different factors, particularly those that are societal and commercial in nature, have combined to drive Norway’s mobile penetration levels at a very early stage on the global mobile market timescale.

5.1.1 Geographical characteristics

The early rollout of wireless networks in Norway and its lingering popularity has most often been linked to the geographic characteristics of the country. High transport costs and long distances between populated areas favored the early deployment of wireless solutions. In addition, in many parts of the country, the ground is frozen for the most part of the year, making the laying of cables underground impractical.

It is interesting to note that in the early stages of wireless network development, wireless network growth occurred mainly between remote fishing towns and villages. To a certain extent, Norway’s large offshore fishing industry continues to drive mobile network deployment to the present day. Mobile coverage over the extensive Norwegian coastline was considered a high priority when the NMT network was first deployed. This importance given to coastal and offshore coverage has again been demonstrated by the decision to expand and extend network coverage over these same coastal areas with GSM technology (using extended cell technology) while NMT 450 is being phased out.

5.1.2 Demographics

The high per capita income level of the Norwegian population is another factor that has been frequently cited as a reason for the high and rapid take up of mobile telephony. In 2002, Norway's GNI per capita (adjusted for purchasing power parity) was 35,840 international dollars, making it the third richest country in the world.³⁴ Added to this, Norwegians have also been seen as having a low consciousness to cost, further weakening the high handset and service cost factor, which was a major barrier in the early stages of development of the mobile market.

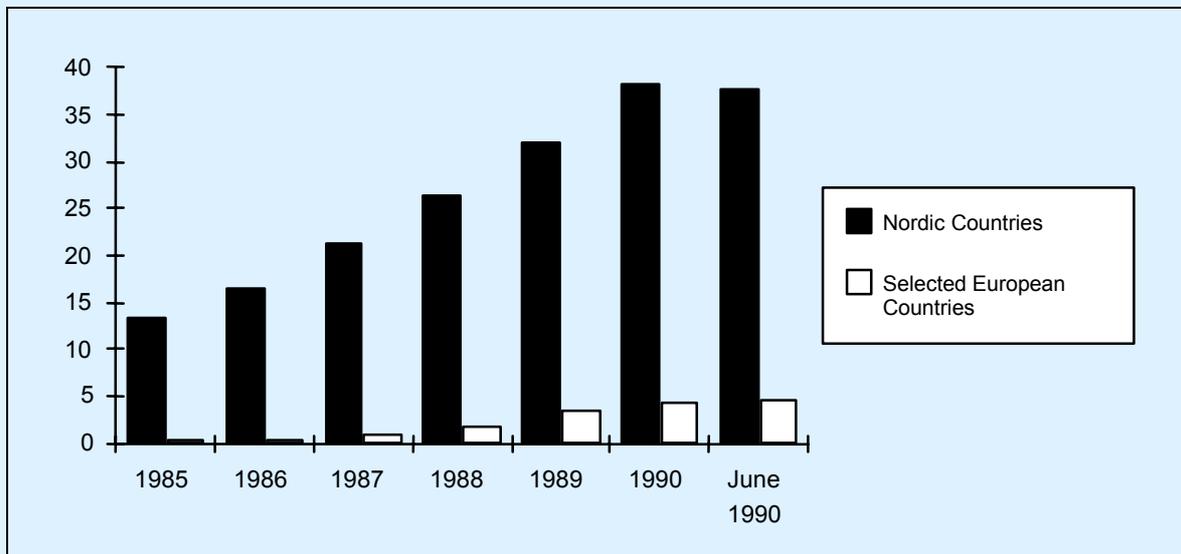
5.1.3 Early adoption

The early introduction and expansion of the Norwegian mobile network played a key role in the development of Norway's take-up of mobile services. Mobile services were introduced from as far back as 1966 and national coverage was achieved rapidly after the introduction of NMT services in the 80s. These factors allowed mobile telephony to achieve a critical mass in Norway before most other countries outside the Nordic region. For example, as early as 1988, Norway had a mobile penetration rate of around three per cent while countries such as the United Kingdom, France and Germany had penetration rates lower than half a percentage point.

Early take-up of mobile telephony also benefited from a relatively reasonable billing rate for mobile services as well as a high level of quality of service from the introduction of mobile services. The success of the NMT standard abroad also contributed to the rapid development of new products and services. More importantly, the use of pure forecasting principles and consequent network planning by Norwegian Telecommunications at the early stages of mobile telephony ensured that equipment supply and network capacity and coverage were sufficient to match demand. In general, Nordic countries rolled-out their mobile networks in the early stages of analogue mobile telephony based on optimistic forecasting models that projected demand far ahead of other comparable countries in Western Europe (see Figure 5.1). Forecasts grew rapidly from predicting one mobile handset per household, to one handset per white collared worker and eventually to one handset per person.

Figure 5.1: Optimistic forecasting

Operator forecasts for mobile telephones per 1000 inhabitants, Nordic countries (Denmark, Finland, Norway, Sweden) and selected European countries (Belgium, Ireland, Italy, Spain, Switzerland), 1986 - 1990



Source: CEPT/ELT/ESE documents 1985.

In general, the early introduction of mobile services in Norway coupled with ample capacity and coverage catering for growing mobile service demand in the critical early stages of mobile telephony, allowed critical market mass to be attained for mobile services far earlier. Eventually, this resulted in the Norwegian mobile market reaching maturity considerably earlier than most non-Nordic countries.

5.1.4 Perceptions and attitudes

There are a number of other more intangible reasons that have been advanced as to why mobile telephony has been so popular in Norway, as well as in the Nordic region as a whole. In general, Scandinavian consumers feel a strong sense of personal interest in the technology that is developed in their region. The sense of pride in things Nordic and a strong Nordic brand loyalty appears to be a hallmark of Scandinavian consumers. Scandinavian consumers have also shown a preference for items that reflect the Scandinavian tradition of plain and functional design. These factors have undoubtedly contributed to the consumer appeal that Scandinavian equipment manufacturers such as Nokia and Ericsson have had in the region.

In addition, technology also receives a lot of attention from the government and both positive and extensive attention in the press. It is something that is seen as “sexy” and exciting by the consumer. In turn, this makes the population extremely receptive to new technology and services.

Media and mobile phone penetration in Norway appear to have an almost symbiotic relationship. Media coverage of mobile related news, in terms of technology, societal aspects or otherwise, has been driven by the pervasiveness of mobile phone use in Norway. With the large majority of their readership or viewership owning a mobile phone, a guaranteed level of interest is assured. In turn, media focus on all things mobile encourages a greater degree of familiarity among the population with the latest mobile products and services on the market.

Finally, it has also been observed that the Nordic lifestyle is very different from that in other European countries. Work in general does not prevent the average Norwegian from having a private life and that private life is respected. It is very acceptable for an office worker to leave at 4pm and go home to his or her family. The attitude here appears to be that while you should be available whenever you are needed, but not necessarily physically present.

5.1.5 Contributing factors

As a more minor consideration, the adoption of mobile telephony may also been boosted by the lack of communications alternatives when out of the home and office. While payphones have been commonplace for a very long time in North America, they have been and remain relatively uncommon in Norway.

In addition, the absence of free local calling on fixed line networks and the availability of value-added services such as voicemail and call forwarding as standard on mobile phones packages also makes the proposition of paying for mobile phone use relatively more acceptable in Norway than in other countries where local fixed line telephony use is close to free.

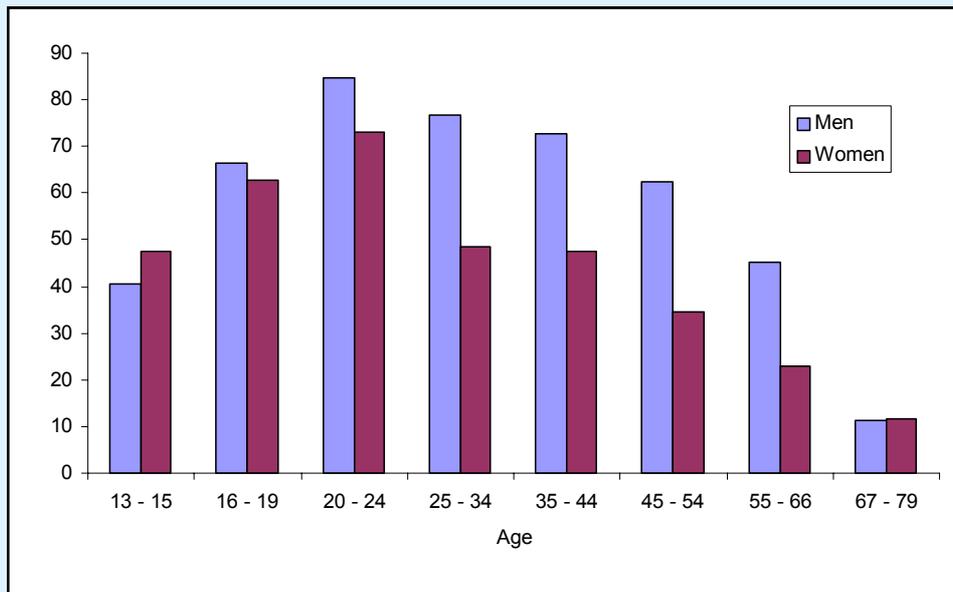
5.2 Patterns in mobile use

Usage data is regularly collected on the basis of user surveys conducted by researchers at Telenor R&D and is used in their analysis of communications usage trends for marketing and product development purposes. This data has also been the basis of a substantial amount of sociological study. This section will briefly outline some of the observations that have been made in this respect regarding mobile service usage trends in Norway.³⁵

In Norway, mobile voice telephony use is largely driven by the age and gender category of young adult men (see Figure 5.2). Studies indicate that young adults are the most intensive user group, having both high ownership rates as well as high usage rates for mobile voice telephony. Usage patterns suggest a steady decline in mobile phone use as ages increase, in the cases of both men and women.

Figure 5.2: Mobile use by age group and gender

Mobile voice telephony use on a daily basis by age group and gender, per cent, 2001



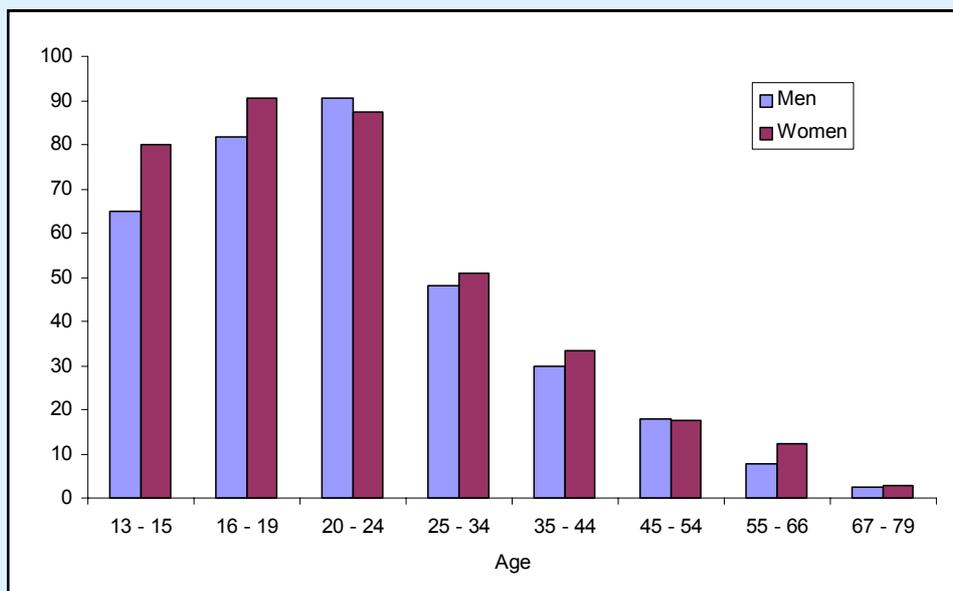
Source: Telenor R&D.

Although mobile telephony usage tapers off in middle-aged groups of users, there is also a significant gap reflected between the genders with women experiencing a sharper drop in mobile phone use than men. A number of reasons have been suggested for this gap. While gender equality is a strong trait of the Norwegian workplace, there are nevertheless more men in managerial positions in most companies than women. It is also far more common for women to be the primary care giver in a family. As such, it has been suggested that mobile voice telephony usage by men in this age group has been driven largely by business use.

Studies also show that in Norway, SMS use is the defining “youth” technology. SMS use in Norway peaks significantly between the ages of 16 and 24 (see Figure 5.3). After that age, SMS use falls off sharply and is generally replaced with the use of mobile voice telephony. SMS use is significantly more limited among mature user groups although trends indicate that SMS use appears to be carried with the youth as they age.

Figure 5.3: SMS use by age group and gender

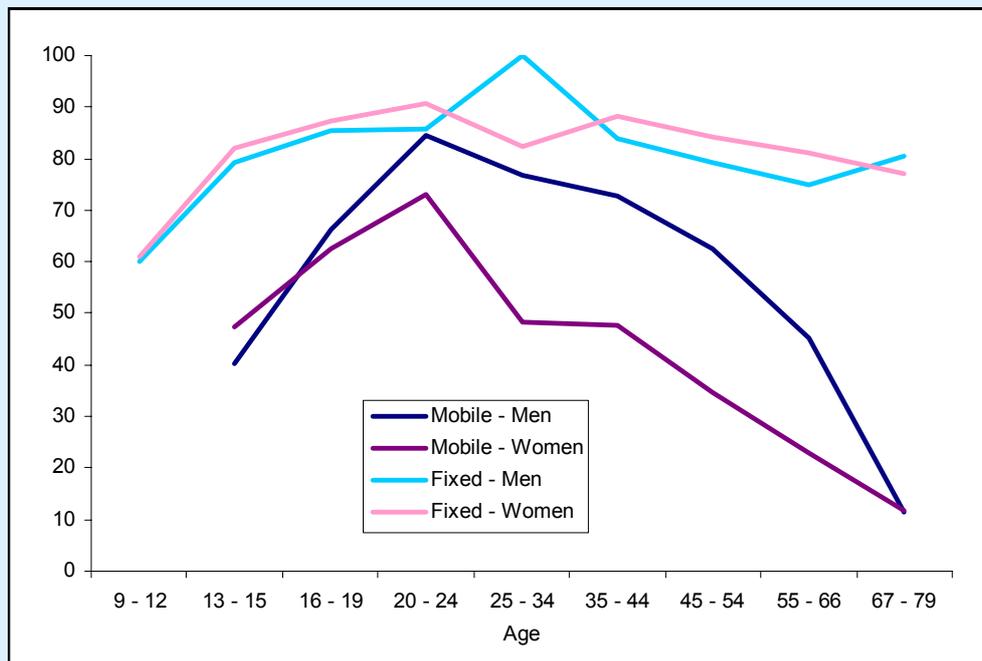
SMS use on a daily basis by age group and gender, per cent, 2001



Source: Telenor R&D.

Figure 5.4: Mobile and fixed line use compared

Mobile and fixed line telephony use compared by age group and gender, per cent, 2001



Source: Telenor R&D.

Looking at fixed line voice telephony patterns, it would appear that after adolescence, there is consistent pattern in the use of fixed line telephony (see Figure 5.4). Practically everybody in Norway uses the phone on a daily basis. After young adulthood, it would also appear that in the case of fixed-line telephony, women use the phone more than men. This is largely in keeping with the sociological observation that women generally carry out more social network maintenance and other social co-ordination tasks than men. Differences in fixed line voice telephony use and mobile voice telephony patterns suggest, however, that women tend to perform those roles typically from home where fixed lines voice telephony is a more cost effective means than mobile.

As a general observation, it would appear that young adult men fill the role of early adopters of mobile voice telephony with adolescents following closely. Historical data suggests that it has been this group, which has driven the adoption of mobile technology in general in Norway. Nevertheless, in terms of non-voice services, such as SMS use, adolescents, particularly girls in their teens, play a critical role.

5.3 Mobile phones and adolescents

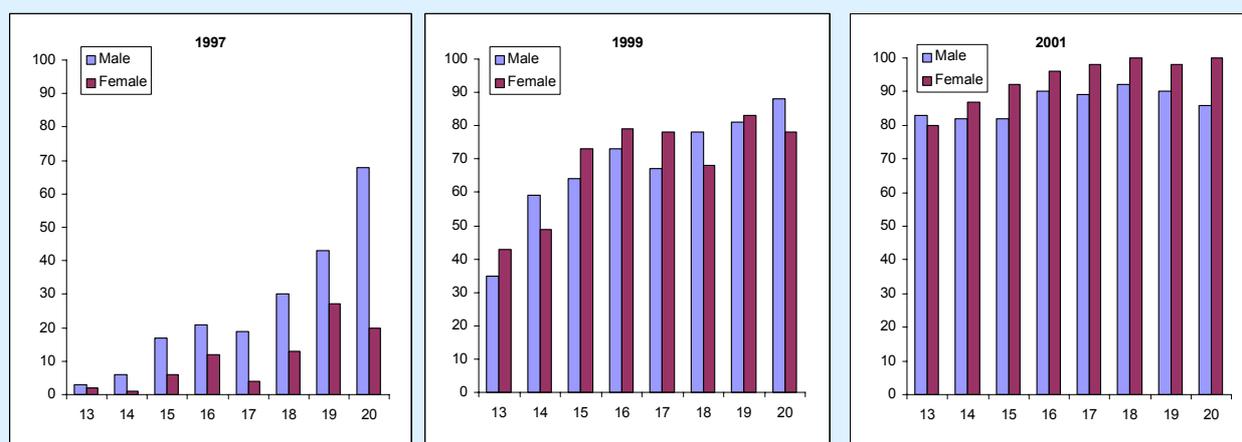
The phenomenon of the extensive mobile phone use among Norwegian teens has been the focus of much study in Norway. Adolescents as a group represent both a very important market for mobile services as well as an interesting social sub-group from which a rich amount of sociological observations can be gathered.³⁶

In Norway, the rate of mobile phone adoption among adolescents has been high. Within a five-year period, mobile phone ownership has passed from being the exception to the rule (see Figure 5.5). This transition has been well documented in a study by Dr. Rich Ling of Telenor R&D who has observed significant ownership trends among Norwegian youth.³⁷ In 1997, mobile phone usage was confined generally to business use. Nevertheless, mobile ownership among the youth category was focused among older adolescents, in particular boys.

1999, however, marked a significant change in ownership patterns among adolescents. The introduction of prepaid subscriptions as well as subsidized handsets was two developments that were central to the widespread adoption of mobile telephony. Furthermore, the introduction of SMS messaging also acted as a significant driver. The long initial free trial period played a large role in the introduction of the technology to the adolescent age group.

Figure 5.5: Adolescent ownership of mobile telephones

Adolescents who own a mobile telephone by age and gender, per cent, 1997, 1998 and 2001



Source: Telenor R&D. The data comes from a series of surveys among a representative sample of adolescents in Norway carried out by Telenor between 1997 and 2001. In each survey a random sample of around 1000 persons was interviewed.

Finally, in 2001, mobile penetration rates have achieved near saturation levels among adolescents. At this stage it is also interesting to note that at this stage, more girls own mobile phones than boys. This is possibly reflective of the notion that although boys were the first to adopt the technology, they were mainly interested in it as an object whereas girls use it more as a tool for social network maintenance. Thus, in the case for girls, as mobile phones become normalized, it also becomes an integral part of the social network where its presence is required for normal social interaction.

In interviews with adolescents pursuant to the same study, a number of motivations were expressed behind their ownership of a mobile phone. Firstly, adolescents regarded mobile phones as being a tool that allows them to be constantly accessible to their social network while allowing them to take a vital step towards establishing an individual identity separate from the fixed geographical identity associated with the traditional fixed telephone. Secondly, the purchase of a mobile phone also represents a step towards emancipation from their parents, particularly where adolescents pay for their own subscription. Thirdly, mobile phones are also viewed as a tool to ensure safety and security. Fourthly, they are also seen as an essential tool for micro-coordination, for example in arranging meetings or for running impromptu errands. Lastly, the mobile telephone is seen as a symbol that crystallizes the user's perception of his status and tastes. To a large extent mobile products and services such as ringtones, logos and interchangeable casings that allow for a greater personalisation of mobile handsets have been driven by this prevalent motivation among adolescents.

Although adolescents have not been seen to be the primary drivers of mobile voice telephony, their rapid adoption and assimilation of ancillary services such as SMS and MMS has nevertheless caused considerable product development and marketing attention to be focused on them by mobile operators.

6 Conclusion

Benefiting from an early start, the Norwegian mobile market has reached levels of saturation far earlier than most other countries. In this respect, its experiences in the mobile sector have provided many countries for some time with a window into the future to guide their market development path. While the Norwegian mobile market has reached maturity, the case of Norway still remains relevant today as a healthy source of innovation and creativity in terms of mobile content services and applications. Together with the wealth of sociological information gathered in respect of mobile use in the country, Norway will undoubtedly continue serve as a reference point for future studies on the mobile information society.

Endnotes

¹ On 23 February 2004, NOK 100 was the equivalent of USD 14.28 or EUR 11.38.

² See Statistics Norway at <http://www.ssb.no>.

³ See Statistics Norway, ICT in the households, 2003 at http://www.sbb.no/ikthus_en/main.html.

⁴ ITU Telecommunication Indicators Database.

⁵ For a brief description of Norway's early telecommunications history see <http://www.lofoten-info.no/tele-mus.htm>.

⁶ "Manual" refers to the process of having calls put through an operator first in order to connect to the desired party.

⁷ When the GSM system was developed, mobile communication was still regarded as independent of the fixed network. Around 1990, ITU developed the concept of personal mobility inheriting principles from the GSM development. The idea was to offer mobility independent of network access. The concept was called Universal Personal Telecommunication (UPT) in Europe and Personal Communication Services (PCS) in USA. The UPT service would enable a user to access and being accesses from the network at any mobile or fixed access point using one unique telephone number. Norway was the first in the world to implement this system. However, it did not become a success for two reasons. First, the access procedure required on telephones were too complicated requiring that between 30 and 40 digits were dialed. Second, the development in price and availability of the GSM system offered the users the personal mobility they requested to an acceptable quality and price.

⁸ The Telecom Market 2002: Statistics and analysis, NPT available at <http://www.npt.no/>.

⁹ The majority of operators have a 14 month inactivity period before deactivating a prepaid card. The figures for GSM prepaid cards do not therefore reflect how many are in use. Subscriptions, however, are paid continuously on a monthly basis which means that the figures for subscriptions better reflect actual usage.

¹⁰ See Nordic Wireless Watch at http://www.nordicwirelesswatch.com/wireless/story.html?story_id=3470.

¹¹ The Telecom Market 2002: Statistics and analysis, NPT available at <http://www.npt.no/>.

¹² For an idea of mobile subscription prices, visit <http://www.telepriser.no/>.

¹³ See <http://www.telenormobil.no>.

¹⁴ See <http://www.netcom.no/>.

¹⁵ See <http://www.tele2.no/>.

¹⁶ See <http://www.sense.no/>.

¹⁷ See <http://www.teletopia.no/>.

¹⁸ Mobile operators maintain that making a voice call is a more fulfilling experience than that of sending an SMS. Nevertheless, in order to gain greater mobile penetration (particularly in the youth segment) and to make consumers more familiar with mobile phone usage, cheaper SMS services are made available and attractive.

¹⁹ Information on individual income tax amounts in Norway are publicly available and can be requested through SMS.

²⁰ Telenor press release, 29 January 2002 at <http://www.telenor.com>.

²¹ Entertainment: Telenor launches music download to mobile phones, 160 Characters, SMS and mobile messaging association available at <http://www.160characters.org/>.

²² According to NRK, this enables a differentiation of opinions and voting based on geography which, in turn, serves as an interesting editorial tool in programs involving debate and voting.

²³ VG survey.

²⁴ For more information, see <http://www.wan.no/>.

²⁵ For more information, see <http://odin.dep.no/sd/engelsk/>.

²⁶ For more information, see <http://www.npt.no/>.

²⁷ See for example: Directive on competition in the markets for telecommunications services (90/388/EEC); Council Directive 90/387/EEC of 28 June 1990 on the establishment of the internal market for telecommunications services through the implementation of open network provision, Directive 97/33/EC of the European Parliament and of the Council of 30 June 1997 on interconnection in Telecommunications with regard to ensuring universal service and

interoperability through application of the principles of Open Network Provision (ONP), Directive 98/10/EC of the European Parliament and of the Council of 26 February 1998 on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment and Directive 97/13/EC of the European Parliament and of the Council of 10 April 1997 on a common framework for general authorizations and individual licences in the field of telecommunications services.

²⁸ More information on the new regulatory framework and on the Act can be found on the NPT website at <http://www.npt.no/>.

²⁹ Termination rates for SMS services are not regulated by the NPT as it is considered a data service.

³⁰ For more information see <http://www.nrpa.no>.

³¹ For more information see <http://odin.dep.no/hd/engelsk/>.

³² See http://www.nrpa.no/dokumentarkiv/Mobiltelefon_rapport.pdf.

³³ For more information see <http://www.fhi.no/>.

³⁴ WorldBank data available at <http://www.worldbank.org/data/databytopic/GNIPC.pdf>.

³⁵ The author would like to thank Dr. Rich Ling, Telenor R&D, whose research has provided the basis of the following observations.

³⁶ For more information, please see for example: Ling R (2001), "Adolescent girls and young adult men: Two sub-cultures of the mobile telephone", Kjeller, Telenor Research and Development, (R&D report r34/2001), Ling R (2001), "The diffusion of mobile telephony among Norwegian teens: A report from after the revolution". Presented at ICUST 2001 in Paris France, June 2001.

³⁷ Ling R (2000) "We will be reached: The use of mobile telephony among Norwegian youth". Information technology and people 13 (2), 102-120.