EUROPEAN
Mobile Communications

REGIONAL & TECHNOLOGY REPORT

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EUROPEAN Mobile Communications

REGIONAL & TECHNOLOGY REPORT

Report Coverage

European Mobile Communications Report covers cellular market developments in the following countries:

Albania
Andorra
Armenia
Austria
Azerbaijan
Belarus
Belgium
Bosnia Herzegovina
Bulgaria
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Faroe Islands
Finland
France
Georgia
Germany
Gibraltar
Greece
Greenland
Guernsey
Hungary
Iceland
Ireland
Isle of Man
Italy
Jersey
Kazakhstan
Kirghizstan
Latvia
Lithuania
Luxembourg
Macedonia
Malta
Moldova
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Romania
Russia
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Slovak Republic
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Spain
Sweden
Switzerland
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Turkey
Turkmenistan
UK
Ukraine
Uzbekistan

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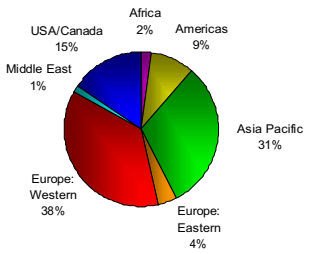
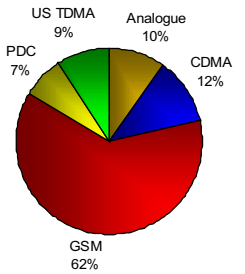
Executive Summary

World Cellular Statistics

Region	December 2000
Africa	15,928,960
Americas	64,451,410
Asia Pacific	220,532,440
Europe: Eastern	29,008,760
Europe: Western	260,581,050
Middle East	10,068,380
USA/Canada	109,601,350



System	December 2000
Analogue	68,980,330
CDMA	82,289,630
GSM	442,912,240
PDC	50,798,000
US TDMA	65,192,150



Source: EMC World Cellular Database

- At a time when capital is not so readily available for UMTS investments, sharing the cost of network infrastructure is increasingly becoming a viable option being pursued by network operators. The trend has already taken off in Scandinavia and in the rest of Europe a number operators have initiated talks. Another option currently being explored is the outsourcing/leasing of infrastructure. This is common practice in the US cellular industry and is yet to catch on in Europe.

- The telematics market appears to be the latest market segment drawing the attention of European network operators. In Sweden, Europolitan has entered into collaboration with Volvo to make telematics services accessible to Volvo car owners, while in Germany Ford and Vodafone recently entered agreements to launch a European telematics partnership. The OnStar initiative from GM is another example.

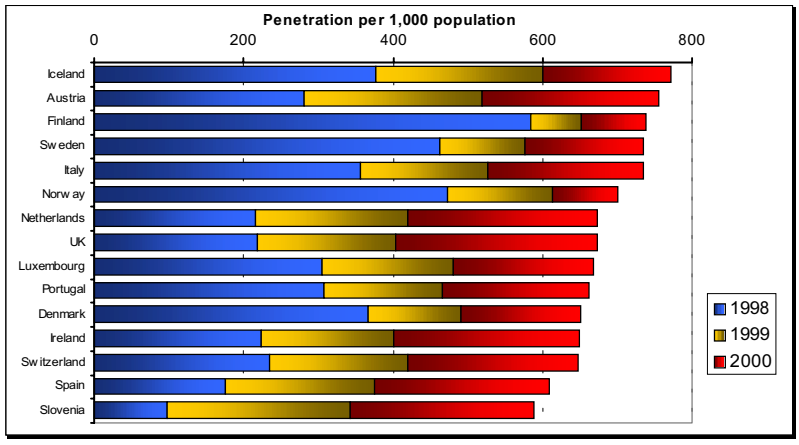
- The GSM Association forecasts 200 billion GSM text messages in 2001, anticipating monthly totals to be around 25 billion. Further growth is also predicted as more creative uses for the service and new information services emerge.

- Once considered a jewel within the telecom sector, Sonera has seen its shares slide dramatically from an all time high of more than EUR 90 last spring to EUR 16.35 this February. The company's future strategic directions as regards its 3G investments has increasingly come under question in the Finnish media. Nor have the reported management crisis and upheavals helped in making matters better.

- Manufacturers used the 3GSM World Congress in February to launch new products ahead of the principal European cellular show, CeBIT, in Hanover this March. Emphasis was mainly on data with many new handsets announced that will support GPRS. Increasingly visible were the availability of plug-in PC cards supporting GPRS. Also on display were many 3G concept models.

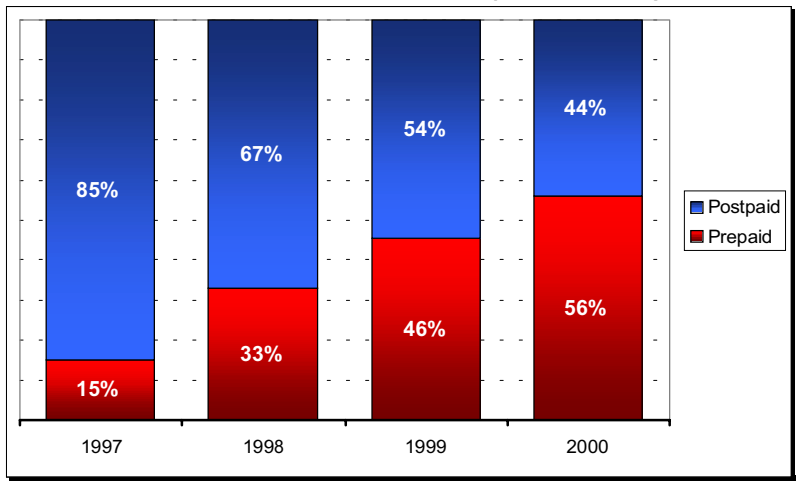
Key Market Indicators

Top 15 European markets by penetration (1998 - 2000)



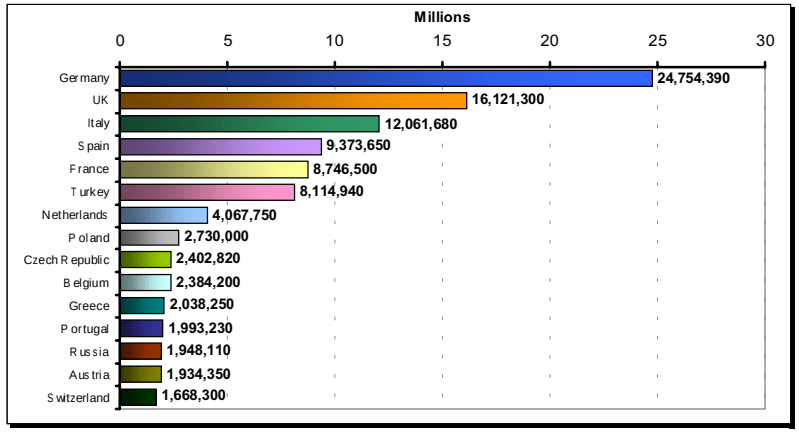
Source: EMC World Cellular Database

European prepaid versus postpaid (1997 - 2000)



Source: EMC World Cellular Database

In-year growth - top 15 markets (2000)

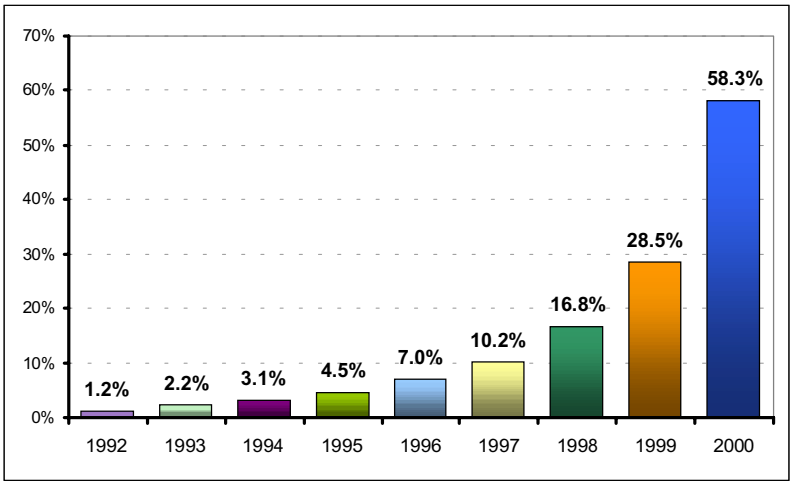


Source: EMC World Cellular Database

German regulator records record growth but predicts slowdown.

Country Report page 40.

German cellular penetration growth (1992 - 2000)

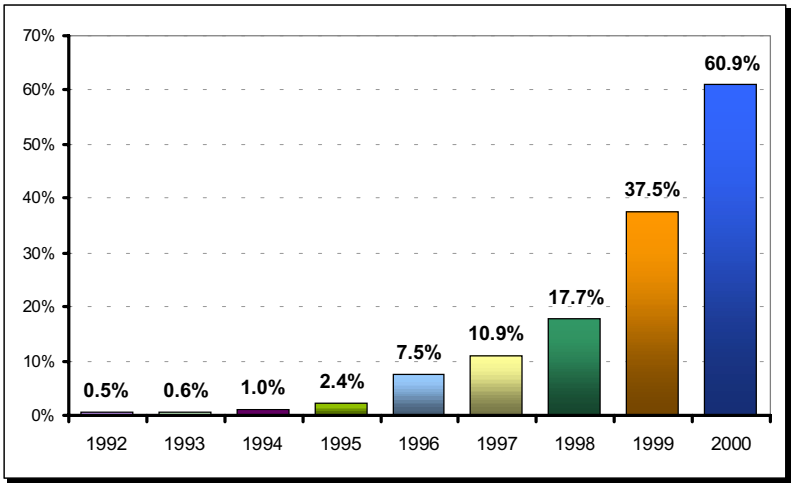


Source: EMC World Cellular Database

The CMT sets out proposals for the Spanish market.

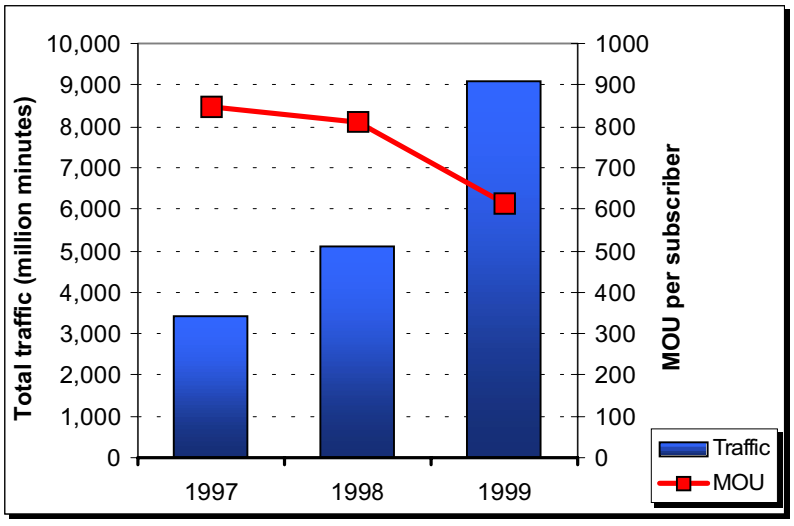
Country Report page 55.

Spanish cellular penetration growth (1992 - 2000)



Source: EMC World Cellular Database

Spanish cellular traffic and minutes of use (1997 - 1999)



Source: EMC World Cellular Database and CMT Report

EMC Focus Report

Cellular handset review from 3GSM Congress

In recent years, manufacturers have increasingly used the February GSM gathering in Cannes to launch many new products ahead of the principal European cellular show, CeBIT, which takes place a month later in Hanover.

This year, the emphasis was very much on data with many new handsets announced that will support GPRS, and many 3G concept models on display. Manufacturers appeared to be confident that they will meet the quoted delivery dates for GPRS models - mostly around the middle of 2001. With delays in launch of operator systems and a possible slow build-up in user demand, it is beginning to look as if handset shortage will not be to blame if the GPRS market does not take off in line with expectations and aspirations.

Examination of the specifications for new GPRS models shows that considerable attention has been paid to the support of WAP over GPRS and there is reason to think that this may become a significant data delivery mechanism once the new packet-based systems are in operation.

As might be expected, manufacturers were playing down talk of any lingering technical issues surrounding GPRS handsets. Recent issues appear to have been concerned with protocol incompatibilities between the various manufacturers' implementations. But it is expected that these will be resolved before widescale launch of GPRS services and it is hoped that users will not experience the problems that became evident with WAP.

It was interesting to note the increasing availability of plug-in PC cards supporting GPRS. There is a feeling that these will play an important role in future wireless data generally, both for 2.5G and, more so, for 3G systems. With constraints on battery power and handset functionality, it is likely that only wireless linked PCs will be able to take full advantage of the offered data speeds.

New product announcements at 3GSM World Congress, Cannes 2001

Brand	Model	Technology	Size (mm)	Wt	Talk/Stby	Remarks
Alcatel	One-Touch 501	GSM/GSM-1800	103x42x23	103g	270m/220h	WAP 1.1
Alcatel	One-Touch 502	GSM/GSM-1800	103x42x23	103g		GPRS 1+1. Av May 2001
Bodycom	Forum	GSM/GSM-1800	90x71x23	165g	340m/34h	GPRS 4+1 PDA. Av 4Q01
Motorola	Accompli 008	GSM/GSM-1800		155g	270m/145h	GPRS. Av mid-01
Motorola	Timeport 260	GSM Triband		108g	210m/150h	GPRS. Delivering now
Motorola	Talkabout 191	GSM/GSM-1800	106x40x15	80g	300m/120h	WAP. Av 3Q01
Motorola	Talkabout 192	GSM/GSM-1800	120x46x23	117g	300m/180h	GPRS. Av 3Q01
Motorola	v66	GSM Triband	84x44x21	79g	180m/120h	GPRS. Av 2Q01
Motorola	v120	GSM/GSM-1800		90g	300m/150h	GPRS. Av 2Q01
NEC	DB4200	GSM/GSM-1800	120x42x22	99g	n/a	WAP. Av April 01
NEC	DB4300	GSM/GSM-1800	120x42x22			GPRS 2+1. Av August 01
NEC	DB7000	GSM/GSM-1800				GPRS 2+1. Av 2002
Novatel	PC Card	GSM/GSM-1800				GPRS. Av June 01
Option	Globe Trotter	GSM Triband				GPRS PC Card
Panasonic	GD35	GSM/GSM-1800	120x46x20	109g	240m/184h	WAP.
Philips	Az@lis 238	GSM/GSM-1800	119x46x28	125g	360m/500h	WAP 1.1
Philips	Az@lis 268	GSM/GSM-1800	119x44x22	99g	240m/350h	WAP 1.1
Philips	Az@lis 288	GSM/GSM-1800				WAP 1.1 + modem
Philips	Fizio 310	GSM/GSM-1800	115x47x22	114g	270m/400h	

Brand	Model	Technology	Size (mm)	Wt	Talk/Stby	Remarks
Philips	Fizio 311	GSM/GSM-1800	115x47x22	114g	270m/400h	WAP 1.1
Philips	Fizio 312	GSM/GSM-1800	115x47x22			GPRS
Philips	Fizio 610	GSM/GSM-1800	110x45x18	90g	240m/350h	GPRS. Av May 01
Philips	Xenium 9660	GSM/GSM-1800	109x41x20	85g	270m/230h	GPRS 3+1. Av Sept 01
Sagem	MC 3000	GSM/GSM-1800	105x50x23	112g	225m/140h	
Sagem	MW 3020	GSM/GSM-1800	105x50x23	112g	250m/170h	WAP 1.1
Sagem	MW 3040	GSM/GSM-1800	105x50x23	97g	250m/170h	WAP 1.1
Sagem	MW 979	GSM/GSM-1800	116x45x18	95g	220m/185h	GPRS 4+1. Av mid-01
Samsung	SGH-A300	GSM/GSM-1800	81x42x22	83g	240m/80h	WAP 1.1
Samsung	SGH-N100	GSM/GSM-1800	105x42x17	83g		WAP 1.1
Samsung	SGH-N350	GSM/GSM-1800	112x42x18	85g		WAP 1.2.1. MME 3.0
Samsung	SGH-Q100	GSM/GSM-1800	112x42x18	85g	210m/100h	GPRS 4+1. Av 3Q01
Samsung	SGH-R100	GSM/GSM-1800	113x48x23	103g	330m/140h	WAP 1.1
Sendo	D820	GSM/GSM-1800	102x44x19	68g	180m/300h	WAP 1.2
Sendo	S200	GSM/GSM-1800		98g	180m/300h	
Sendo	Z100 Smartphone	GSM Triband		99g		GPRS 3+1. Av 3Q01
Sierra	Aircard 750	GSM Triband				GPRS 4+4. Av 2002.
Sony	CMD-MZ5	GSM/GSM-1800	88x49x21	82g	220m/150h	2-hour music playback
Telular	SX4D Desk phone	GSM				
Xircom	CreditCard GPRS	GSM/GSM-1800		57g		GPRS 4+1.

Alcatel was showing its first GPRS product, the One Touch 502, and quoting April/May availability. The 1+1 handset has a number of features emphasising support for WAP over GPRS. It can store up to 10 different WAP profiles which describe different gateways, allowing change of provider without the need to change handset settings or enter new passwords. Also on show was the One Touch 501 which is an updated version of the basic One Touch 500 which was launched at CeBIT 2000. Alcatel was demonstrating its handset evolution strategy towards 3G. It has a further GPRS product planned for launch around November 2001, based on the 700 series family; this is expected to have 2+1 timeslot support. A Class 10 GPRS product (4+1) will be launched in early 2002, followed by a dual-mode GPRS/UMTS product at the beginning of 2003 and a multimedia phone in early 2004. The Cannes display concentrated on GPRS announcements and stand representatives said that further new product announcements would be made during CeBIT in March.

Audiovox is currently delivering the GDX 250/300/325/350 GSM products to markets in Greece, Cyprus, Spain, Denmark and Slovenia. These phones originate from Acer and GVC. Also on display was the GW-400, of unknown origin, which is scheduled for delivery during the next few months. This is a dual-band 85g product with WAP support. Audiovox was also showing a number of concept design models designated GDA-220 (dual-band) and GT-588 (tri-band) but there were no details on specification or original manufacturer.

Benefon had no new products on display and was concentrating on its two current deliverables, the Benefon Q, which was first seen at last year's GSM World Congress, and the Esc! which has an inbuilt GPS navigation facility.

Bodycom is a California-based start-up company that was announcing its Bodycom Forum Communicator at Cannes with commercial deliveries due to begin during Q4 2001. The basic PDA will incorporate support for dual-band GSM operation on either 900/1800MHz or 900/1900MHz, 4+1 GPRS (Class 10), WAP and Bluetooth. Optional USB expansion modules will allow connectivity to a range of additional features including fingerprint sensor, compact flash, GPS and 802.11 interface. There will be an optional fully integrated smart card reader for e-commerce applications. The device will measure 90 x 71 x 23mm and weigh 165g with the 2000mAh optional Li-Ion battery providing up to 5.6h talktime. The 65,536 colour active matrix TFT screen has an 80mm diagonal (240 x 320 pixels) and the operating system is Windows CE 3.0.

Ericsson was concentrating on its broad industry offerings leading to 3G systems and had little to show in the handset area apart from its current deliverable range which includes the R520 with GPRS support and was scheduled to begin delivery in commercial volumes during Q1 2001. It is possible that there will be new product announcements during CeBIT in March.

Motorola announced a number of new GPRS products that will deliver during 2001. The Accompli 008 made its European debut at Cannes. This is a dual-band GPRS PDA developed on the A6188 platform which has been seen in far-east markets. It features a large touch screen and should not be confused with the Accompli 009 which has a full QWERTY keyboard and is a business version of the v100. The Accompli 008 supports full email access for POP3, IMAP4, SMTP, MIME, FAX and SMS. It has handwriting recognition support for a range of input languages including Chinese. The unit weighs 155g and will begin commercial shipping in the middle of 2001. The Timeport 260 is claimed to be the world's first triband GPRS phone and is already being delivered to markets in Europe, the Middle East, Africa and Asia. Two additions to the Talkabout range were showing reduced weight and profile over current models. The Talkabout 191 is a 66cc/80g model with WAP support in a 106 x 40 x 15mm package. It supports a wide range of features including text input, icon-based interface, datebook, games etc and will ship during Q3 2001. The Talkabout 192 has similar features but additionally supports GPRS and is in a slightly larger package. This will also be available during Q3 2001. There were new products in the clamshell-styled V. series on display - both scheduled for commercial availability during Q2 2001. The v66 will support tri-band GPRS in a 65cc/79g package and has some advanced features such as user selectable tri-colour backlit display, organiser function, FM radio accessory and digital voice recorder. The v120 is a dual-band GPRS handset in a 82cc/90g package and will support advanced SMS functionality for group texting.

NEC has encountered delays in delivery of its DB4000 model which was originally announced at CeBIT 99 and scheduled for delivery at the end of that year. It is now probable that it will be overtaken by the new DB4200 which is similarly modelled but includes WAP support. Samples are currently under test with operators and deliveries should begin during March or April. NEC's first GPRS phone, the DB4300, is expected to be available by August 2001. This uses the same physical platform as the DB4000 and will have support for 2+1 GPRS. Under development is a second generation GPRS product which will appear as the DB7000 and will be a colour display fold phone. NEC is promoting a software concept known as 'WEB/WAP' which provides the means of delivering WAP colour functionality under releases 1.1 to 1.3 using compatible software in the host system and the user handset.

Nokia had nothing new on show in the handset area. Its current GSM product range is based around the 3310, 6210, 6250, 8210 and 8250 product groups. Nokia remains one of the few major manufacturers not to have made any GPRS handset product announcements.

Novatel, which in the past supplied branded analogue handsets from JRC, is beginning to re-enter the subscriber unit market with a range of plug-in wireless modules. It is currently supplying modules supporting CDPD and Richochet for use with Palm and Handspring PDAs. The company has a range of PCMCIA units under development that will begin delivery during 2001. GSM-1900/GPRS is scheduled for April; GSM-900/1800/GPRS for June; CDMA IS-95A for April; and CDMA 1XRTT for June. Scheduled for mid- to end- 2002 availability will be a UMTS PCMCIA card.

Option is a Belgian-based company that designs and manufactures data communication products for PSTN, ISDN and GSM markets. Its GSM wireless products have included a

number of PC card modems and the Melody GSM dual-band phone module which is used as the basis for a product developed by Xiamen for the domestic Chinese market. During 2000, Option introduced a GSM phone module for Handspring's Visor product line. At Cannes, the company introduced the Globe Trotter tri-band, 3+1 GPRS PC Radio Card. This is a class B device allowing voice calls to be received during data transmission. The product delivery includes Option's Wireless Communication Manager application that enables the integration of data, phone and SMS functionality to Microsoft Outlook and the MS Windows operating system. Option has announced a partnership with Mobistar in Belgium for the supply of Globe Trotter cards. Availability for the new product is Q3 2001.

Panasonic launched its latest GSM product, the GD35, which is a follow-on handset from the GD30, similar in styling but with reduced weight at 109g and increased battery duration. It includes a WAP 1.1 browser and T9 text input. Panasonic's first GPRS product is due for launch during Q2 2001. This is of similar styling to the i-Mode product made for NTT, the P501i which has a developed graphic user interface and joystick navigation for ease of use in WAP environments. The display has a 16 character x 10 line capacity with an additional two lines for icons. Manufacture of GSM products remains located at Thatcham UK where 220 design staff are currently employed. Planned expansion during 2001 will increase this number to 350 as activities gear up for 3G. The demonstrations at Cannes highlighted Panasonic's growing 3G capability featuring BTS development and a number of concept 3G phones showing various multimedia applications in simulation mode.

Philips chose 3GSM to launch a range of new GSM handsets including a number supporting GPRS. The Xenium 9660 will ship in September 2001 and will support 3+1 GPRS plus WAP 1.2. PC synchronisation is achieved through IrDA, Bluetooth or a plug and play cable. The Xenium 9660 picks up all of the features in the basic Xenium 989, comes in the same 85cc/95g package and will ship commercially in September. Philips also announced two new product families. The Az@lis is aimed at the fashion-conscious market using various combinations of finishing materials to produce distinctive end products. There are three versions - 238, 268 and 288 - all are dual-band with WAP 1.1 support and generally similar feature sets but each with slightly different styling. The 238 is designed as an entry-level product with a 670mAh NiMH battery and 125g weight; the 268 provides a lighter package at 99g with a 550mAh Li-Ion battery; the 288 is the top of range model and incorporates an organiser and internal modem. The Fizio family follows fairly traditional styling models with a central rocker button for menu and function selection and a 96cc/114g package. Four family models were announced. The Fizio 310 is targeted at first-time users with basic functionality but including voice dial and vibra-alert. The Fizio 311 adds a WAP 1.1 browser and T9 text input. The third member of the Fizio 300 family is the Fizio 312 which will add GPRS support. Also announced was the Fizio 610 which also supports GPRS and is a top-of-the-range model. The precise functional differences between the 312 and 610 were not clear from available stand information. All new Philips models are due for delivery in mid-2001.

Sagem introduced its new 3000 family of handsets which was previewed at Telecom Asia in December 2000. These will replace the current 900 series during 2001. The principal improvement is the size of display which is increased to 26 x 38mm and this goes with improvements in weight and battery performance. The MC 3000 is the entry level product for the new family and provides dual-band operation in a 79cc/112g package with up to 225 minutes talktime. The MW 3020 (the W indicates WAP support) adds a 1.1 browser and T9 text input. The current top-range MW 3040 adds a built-in data/fax modem. During 2000, Sagem appeared at a number of shows with GPRS demonstrations using a prototype handset labelled as the MC 850 GPRS. The MW 979 was announced at Cannes and represents Sagem's first commercial GPRS handset scheduled for launch during 2001. This was being shown in a live stand demonstration in a 4+1 timeslot configuration. Other

versions will be available as the MW 959 and the MW 939 supporting 3+1 and 2+1 respectively. The WA 3050 is a 198g PDA product which uses the new Microsoft Pocket PC operating system. It has a 205MHz StrongArm processor, a 16Mb expandible memory, built-in data/fax modem, IrDA support and a wide range of available software. The monochrome screen is 60 x 80mm with 240 x 320 pixels. The initial version supports WAP and it was said that later versions would incorporate GPRS. The MW 939E does not support GPRS but has an incorporated credit card reader for support of e-commerce applications. A non-WAP version of this phone, the MC 939E, was announced at Telecom Asia 2000. The MW-X1 is a ruggedised phone product with 10-hour talk time and 200-hour standby. The MM@1GPRS is an external PC modem unit which will support 4+1 GPRS operation.

Samsung appeared with a host of new product announcements with concept examples displayed under glass. As is usual with the company, there was little information available on which of these will progress to commercially available products. SGH-A300 is an upgrade to the SGH-A100; SGH-N100 was announced at the end of 2000 and provides WAP support in an 83g package. The SGH-N350 is based on the N100 platform and was the only live demonstration on the Samsung stand. It was showing applications running under Microsoft Mobile Explorer 3.0. The SGH-Q100 is announced as Samsung's first GPRS product which was said to be scheduled for Q3 2001 delivery. Two further new product announcements were the SGH-R100, a flip phone aimed at the student/youth market, and the SGH-N300, a WAP-supporting phone.

Sendo used the 3GSM gathering to announce a number of additions to its product range following the launch of its first product, the D800, in late-2000 and which is now shipping to a number of markets including Netherlands, UK, Belgium and Hong Kong. The D820 is an upgrade to the D800 and will add a WAP 1.2 browser facility. The S200 is a completely new product which is aimed at the prepay MVNO and OEM markets. To address the needs of flexibility when dealing with different detailed requirements, the product is delivered to the European distribution centre at Zevenaar in The Netherlands, from the Guangdong factory, as a basic transceiver unit. The units are then customised by the addition of covers, keyboard and configuration software. This allows Sendo to ensure a rapid response to changing ordering patterns from a wide range of OEM or co-branding distributors. The S200, which will begin shipping in 2Q 2001, is an 89cc/98g package providing 180m/300h battery duration. There was considerable interest in the Z100 Smartphone that is scheduled to ship during Q3 2001. This is an extremely compact 99g, tri-band/GPRS (3+1) unit incorporating a 65,000 colour TFT display and a comprehensive range of features. Operation is based around Microsoft's 'Stinger' platform which provides advanced support for corporate data and WEB access.

Siemens had no new products on display at Cannes. Its main handset focus was on the latest SL45 and associated MP3 functionality. It was also providing a number of GPRS capability demonstrations using a Sagem handset and a Siemens 'prototype' GPRS handset which appeared to be based on the S25 - but there were no announcements on planned commercial GPRS products.

Sierra Wireless, which currently supplies PC card packages supporting CDPD and Richchet, announced its Aircard 700 series supporting GSM/GPRS. These will come in two versions - the Aircard 710 for GSM-1900 in North American markets, and the Aircard 750 with tri-band support. Both are GPRS Class 12 devices allowing up to 4+4 timeslot operation - although current planned GPRS implementations will only allow the concurrent usage of a total of five timeslots. The single band version will begin deliveries during Q4 2001 to AT&T. Sierra Wireless is also developing the Aircard 800 series in collaboration with Nortel. This will support a range of UMTS-related options: both single- and multi-mode. First samples are scheduled for delivery during 2002.

Sony showed its latest products, the CMD-J5 and CMD-Z5, which were announced during 2000. New for Cannes was the CMD-MZ5 which incorporates music playback functions by use of Sony's proprietary 'Memory Stick' plug-in module. This provides up to two hours' playback time. The CMD-MZ5 can be directly connected to a CD player or HiFi stereo unit for recording purposes.

Telular manufactures a wide range of wireless units supporting fixed operation. The latest of these is the SX4D family of desktop phones. These are full-featured touch-tone units with integrated wireless interface. Versions will be available for TDMA-800, GSM-900 and GSM-1800.

Trium was showing its latest handsets including the Mars and Neptune, but announced no new products. The Mondo PDA was being demonstrated on the stand and a show announcement stated that a future range of smart phones would appear at the end of 2001 based on Microsoft's new Stinger platform.

Xircom added to its range of PC cards with the CreditCard GPRS wireless modem. This will support dual-band operation, either 900/1800 or 900/1900, and Class 10 (4+1) GPRS.

Regional News & Events

GSM Association forecasts 200 billion GSM text messages in 2001

At the 3GSM World Congress in Cannes on 21 February 2001, the GSM Association announced that a record 15 billion SMS text messages were sent over the world's GSM networks during December 2000. The figure indicates a five-fold increase in the volume of text messages generated each month by GSM users over the past year. The GSMA anticipates that by December 2001 monthly totals will be around 25 billion and set to reach a total of 200 billion for the year.

The December 2000 total for the UK was 756 million messages, representing a growth of 300% over December 1999. In Germany, the December total reached 1.8 billion. The Asia-Pacific region is also undergoing rapid growth of SMS, particularly in China, Singapore, Hong Kong and Australia. In the Philippines, the daily total of SMS has reached over 18 million and network operators are now making a token charge to encourage 'responsible text messaging', while volumes carry on growing as the prepaid total expands.

The GSMA sees continued growth in SMS traffic as more creative uses for the service and as new information services emerge, but anxiously awaits the arrival of more non-Latin-based alphabet terminals, more accessories and larger display terminals.

The GSMA also reported good progress in its quest to create seamless interoperability between GSM and other wireless standards. The GSMA reports that 110 operators and suppliers have joined the Roaming Forum which is drawing up the blueprints for other wireless standards to roam with GSM. Despite this progress and some pressure from many of its members, the GSMA has been unable to see its way to extending membership rules to embrace other system operators at the present time. However, the Association welcomed a 'multitude' of 'new wave' technology suppliers as Associate members in February 2001. Among these are Microsoft, Cisco and Psion.

UMTS network roll-out - the trend towards cost sharing

At a time when capital is not so readily available for UMTS investments, telecom operators are increasingly leaning towards the option of sharing the costs of building out their UMTS networks in an attempt to lessen the financial burden.

Sweden

Telia was the first to fire this salvo in Sweden, when it signed an agreement in principle with Tele2 to form a 50-50 joint venture company that will build and operate a UMTS network. According to the terms of the agreement, Telia and Tele2 will act as MVNOs and buy capacity from the network company. The newly established network company aims to build a UMTS network providing nationwide coverage in Sweden. Both parties' existing infrastructure will be combined to support traffic in the UMTS network. In the market, Telia and Tele2 will continue to compete individually for mobile customers with their respective service offerings. The two operators also intend to investigate the possibilities of establishing a similar joint venture in Norway, where they both won UMTS licences. The final agreement is subject to approval by competition authorities and the regulator (PTS).

In a similar arrangement to the Telia/Tele2 agreement, two other UMTS licence winners Europolitan and HI3G have also agreed to cooperate, subject to regulatory approval,to roll out a UMTS network in Sweden. The plan is to set up a common company to build

and provide UMTS infrastructure, mainly outside the three major metropolitan areas of Stockholm, Gothenburg and Malmoe. The parties intend to build 70% of the population coverage. The companies' independent UMTS infrastructure efforts will be concentrated in the metropolitan areas. Under the cooperation agreement, each company will have equal access rights to the infrastructure. The companies will retain their operating independence including designing and delivering customer services and content. The agreement provides Europolitan and HI3G with a platform to invite other parties to take part in the building of UMTS infrastructure. In Sweden these agreements are fully in line with The Swedish National Post and Telecom Agency's guidelines on cooperation.

Germany

We are also beginning to see a similar trend in Germany, with Viag Interkom stating it was in talks with rivals about joining forces to roll out their UMTS network.

UK

In the UK, Hutchison 3G UK has chosen a different path in its attempt to reduce capital expenditure in its UMTS network roll-out, by sharing masts rather than building its own infrastructure. In this connection it has entered into an agreement with Crown Castle International, which owns and operates transmission masts on behalf of broadcasters and mobile phone operators to lease space on a minimum of 1,000 sites per year, for the years 2001 - 2004. The lease term at each site will be 25 years. BT Cellnet has also chosen a similar path, having signed an initial agreement with Crown Castle whereby the operator will lease space on a minimum of 1,500 Crown Castle sites throughout the UK for its UMTS network roll-out over the next three years.

With the current market outlook facing European mobile operators, we are bound to see a plethora of infrastructure sharing deals in the coming years. The examples stated above are merely a sign of the things to come.

Mobile location and telematics providers at 3GSM Congress

A number of firms were present at the 3GSM Congress in Cannes with the aim of showing off the position-based services that they offer. The potential of position-based or telematics (onboard monitoring devices incorporated into vehicles) to offer personalised applications to the user should act as a spur to the implementation into commercial GSM networks.

The definition of telematics has spread from the onboard monitoring and despatch of vehicle performance (fuel levels, component temperatures) to devices and platforms that transmit data relating to location and driver health and safety.

Wireless Car

Wireless Car, a developer of telematics/mobile applications for the international automotive market, outlined its vision for the immediate future of mobile devices and their integration into vehicles. One of the key drivers for telematics will be as a means to improve safety; Wireless Car described them as 'the next airbag'. The spokesman believed that the emergency uses of telematics and other premium services (eg informing the central control automatically that an accident has occurred) will be one of the principal market drivers. The diagnostic aspect of the applications may be useful to manufacturers if they can be shown to save them revenue. Predictions for uptake of service were that they would be standard features in the USA by 2007. It is unclear at the moment who will own the brand of telematic devices: will they be associated with network operators or vehicle manufacturers?

Revenue opportunities will include billing and the possibility of vehicle manufacturers acting as MVNOs.

To date Wireless Car has provided integrated telematics to manufacturers in Europe, the USA and Asia. The company is a joint venture between Ericsson, Telia and Volvo. Wireless Car has a full commercial operation with Volvo (Volvo on call) which offers emergency assistance and notifies the control centre of airbag deployment via SMS. In response to a question from the floor that SMS can be slow in arriving at its intended destination, the spokesman replied that SMS is the most secure GSM platform available.

Opteway

Also at the Congress was Opteway, a firm specialising in the provision of location-based services for PCs, mobile handsets, PDAs or in-car navigation systems.

Services for mobile operators:

- Real-time traffic, weather and parking data
- Driving directions
- Detailed maps.

The company uses its TopoGateway product which is a Java-based framework to offer geographical services to WAP devices, PDAs and (via SMS) GSM handsets.

Decell

Decell can lay claim to being one of the more interesting location-based/telematics providers demonstrating its wares at Cannes. Its uses existing technology only to provide up-to-the minute personalised traffic reports and journey times without the need for roadside monitoring units or vehicle-mounted GPS. Decell monitors the amount of traffic on the roads by tracking the number of active GSM handsets and sending out a succession of random signals; the replies of the handsets are placed using cell broadcast technology.

The replies received from the handsets are used to build up a picture of traffic patterns which algorithms breakdown into ETAs for drivers. Any events like accidents or roadworks show up in the patterns and alter the estimations (Decell claims 5% accuracy). Mobile users can obtain journey time estimates via a voice message, SMS or WAP-based text.

Stated benefits of the Decell service include:

- No infrastructure needed
- Revenue possibilities for network operators
- Ease of launch and use
- No value chain (and subsequently no revenue sharing)
- Potential revenue source for re-sale (raw real-time traffic data).

Any network operator running the service needs only one PC to dial up and calculate the journey times. For the calculations only 1% of handsets need to be switched on. The fact that the service utilises something that operators do as a matter of routine (sending messages to handsets to locate within the cells) rather than relying on costly roadside infrastructure should enhance its appeal. The only limitation is that its investors envisage

users checking journey times for preset routes (which they are normally very aware of anyway). Decell will need to complete an agreement with an innovative operator and widen the remit to include any journey rather than a single route, which is what Decell's AutoRoute 1 product currently delivers.

WebTech Wireless

WebTech, a vehicle location service provider, produced a series of growth highlights which it believes illustrate the potential that combining mobile service with the frequently captive urban car user audience offers:

- Americans spend half a billion hours a week at the wheel
- Location services will grow to $25 billion by 2005
- Automatic Vehicle location revenues for fleet users will grow to one billion by the end of 2004.

WebTech offers the Quadrant Vehicle Location System which offers service via an in-vehicle PDA and online portal. The PDA is designed to replace some of the traditional bulky terminals used by vehicle traffic systems today. The PDA delivers two-way text messaging to the driver and is designed to act as a mobile portal for a future range of services.

Quadrant system overview

Sector Locator in-vehicle tracking device uses GPS to locate the vehicle and acts as gateway to the driver's PDA. The location of the vehicle is transmitted through a wireless network to the WebTech Network Operations Centre. A central hub collects, processes and delivers location data. The vehicle's position is then displayed via the WebTech Location services portal which the fleet manager can access via any internet-enabled PC.

The network uses GSM tri-band plus satellite services to provide adequate coverage. The system was successfully demonstrated and is aimed at the commercial fleet management sector. This sector is already well served; the real breakthrough, if the research WebTech has commissioned is to be believed, is for the service to become available to the private users.

Yeoman Group

The Yeoman Group showed off another GPS location-based system which was notable for its turn-by-turn based navigation service which issues spoken directions via a standard GSM handset. The company also used Cannes as an opportunity to announce a tie up with 3G Lab to develop 3G location-based services.

Representatives were keen to stress that content has been provided by a leading provider of cartographical services and is 'technology agnostic', not tied to any one method of location technology. To provide turn-by-turn based navigation Yeoman currently uses a vehicle-mounted GPS chip. Cell broadcast technology was considered but does not currently offer a high enough degree of accuracy.

GAP

GAP demonstrated two products at Cannes: a fleet management system and a personal tracking and communication device. The Datafleet tracking system uses a GPS satellite locator and allows a despatcher to track vehicles, goods or couriers via SMS updates. In

addition the service uses high resolution mapping to give an accurate indication of the signals location (accurate to within 50 metres).

In addition to vehicle tracking GAP also offers a variation designed for personal location and communication. The HiPer handset is basically a simplified mobile phone handset with limited, simplified design (an emergency button which relays the user's position to the control centre and a push to talk for preset numbers) and a GPS chip to provide an accurate location. The HiPer is one of the smallest GPS-enabled devices on the market and is being marketed as providing peace of mind when carried by children, the elderly and other vulnerable groups. The device was significant for the fact that it offers location-based service to a non-driver and is also the first ever device to incorporate the TC35 dual-band GSM module from Siemens.

Signalsoft

US application developers are aided by the fact that the FCC E911 will require operators to be able to locate a handset to within a 100-metre radius. Differing standards meant that, unless the operators have developed a GSM platforms the services will not be available in Europe yet.

One US developer was present and updated attendees with the services that it provides to meet E911 requirements: the wireless 911 product it offers is able to offer actual geographic locations rather than cell broadcast positions. Its bfound.com service allows mobile phones to be traced via a standard web browser.

Motorola

Motorola's stand exhibited a mock-up of its telematics and direction finding services. It uses a full size screen to offer direction finding, roadside assistance and entertainment services. In an important safety move the unit uses voice recognition technology to prevent the applications providing a dangerous distraction from the road.

The following services were on show:

- Smart Radio
- Location-based services (route planning and positioning)
- Estate Agent (address finder).

Summary: GPS chip issue/Telematics in the USA

In conversations with exhibitors it became clear that the sector remained focused on the fleet management aspect of service provision. Although Yeoman and Decell stated they were in talks with network operators in the UK and Italy respectively they refused to be drawn as to the identity of their prospective partners or any possible launch dates. One possible impediment to the uptake of geographical services by a wider clientele is their reliance on GPS chips. These add to the weight and expense of handsets and the amount of handset churn on the contemporary market would create difficulties for mobile solution providers.

A detachable GPS chip was suggested as a solution to this. If the GPS chip can become more portable as the SIM card has done this might be a solution to these obstacles. It would seem that the USA remains ahead of Europe in the telematics field owing to the greater size of its market for commercial and private users and the E911 requirement. Although not exhibiting at the show, the Onstar initiative from GM provides an example of

this level of development. Formed in 1996 the subsidiary provides a variety of solutions for the driver. Until recently its services consisted of the usual emergency, navigation and roadside assistance applications supplied to the higher end car models. In 2001 the unit extended the services to a wider range of models and increased subscriber growth to nearly 800,000.

The OnStar group has announced further expansion plans despite recent slowdowns in the vehicle and telecoms sectors. Two of the products that it reports increase consumer awareness of the telematics sector are the OnStar personal calling and the OnStar Virtual Advisor. The Virtual Advisor allows the user to make hands-free calls using voice recognition software and represents an advance in convenience and safety over using handsets while driving. The Virtual Advisor provides voice-based connectivity to the internet and allows the user to receive emails on the areas of their choice. One aspect of telematics which may slow the uptake of the service is the fact that operators have to tackle the problems of vehicle churn.

Once an Onstar-equipped vehicle is sold the operator must try and win back the new owner. A future threat to inbuilt telematics may arise from handsets designed to integrate into the vehicle through some sort of interface. Onstar is planning the launch of conventional GSM services via an MVNO agreement with a UK operator (possibly One-2-One) during 2001. This move may see it offer innovative vehicle-based services without the need for inbuilt telematics.

European roaming to boom in 2001

Roaming is likely to be a major growth area for the GSM market in Europe according to a number of companies at the 3GSM World Congress in Cannes, France. The expected growth comes against the backdrop of concern by the European Commission that subscribers are being charged too much for roaming services.

Growth

Operators in Europe are jealously guarding their statistical information for roaming, but the industry consensus is that roaming revenues are large and are continuing to growth. The GSM Association said: 'There is a huge amount of profit in roaming. European operators are supposed to be reducing prices or at least keeping them stable, but the opposite is true.' Operators are rarely under regulatory obligation to declare roaming activity, one of the few exceptions being the UK where operators have to report to OFTEL.

Operators are keen to increase roaming as it generates large revenues relative to the comparatively low amount of investment it requires. In June 2000, Swisscom said that around 3% of its monthly MOU was made up of postpaid roaming. The revenue generated by inbound and outbound roaming six months earlier in January 2000 was '12-13% of total monthly revenue'. Swisscom has lost perhaps 25-30% of its market share for inbound roamers to Sunrise/diAx and Orange, but the profits are still substantial. Dan Net, the Danish clearing house, estimates that roaming ARPU levels could be up to 20% of total revenues for some operators. Comfone, the Swiss roaming broker and clearing house, said there is still huge growth potential. 'In 2001 we will see revenues peak for domestic subscribers, but there is no peak in sight for international roaming. The share of roaming revenue will definitely increase.'

Tariffs and services

The cost of roaming remains high largely because there is little subscriber pressure to reduce prices. The majority of roamers are business people on postpaid contracts. Dan Net said prices are unlikely to fall in the near future: 'Business people are the subscribers

who generate most roaming income and because their bills are paid by their company, they have little interest in reducing tariffs.' The average non-business postpaid subscriber, who is likely to be more cost-conscious, is less likely to roam. This subscriber probably has the partly true perception that roaming costs too much and would naturally use a fixed line in the visited country rather than his or her GSM handset.

The provision of a roaming cost evaluation service by Swisscom seems to confirm that subscribers do not behave in the same way when they are abroad. A source at the Swiss GSM-9/18 operator said that its '333' service, which enables subscribers to check via SMS the cheapest roaming operator in the country they are visiting, hardly has been used. That may be due to a lack of proper promotion, but the evidence backs up the argument that roamers are generally not cost conscious. The service, which benefits the subscriber, also enables the home operator to direct subscribers to a particular visitor network. The home operator is then in a strong position to fix preferential tariffs with the visitor network, creating savings it may or may not pass onto the subscriber.

The use of roaming services is likely to increase naturally in much the same way as domestic mobile services have done. The other strong driving force in 2001 will be new services offered by operators. A wave of promotions is expected prior to summer 2001, along the lines of '50% off calls back home during your summer holiday'. Operators will concentrate on offering the same services to roamers as domestic users, such as shortcodes or location specific services. Some operators may begin to send roamers more automatic SMSs alerting them to particular offers when they arrive in a foreign country. A new breed of tariff is also emerging: the preferential or rerating roaming tariff, which has been pioneered by Viag Europlattform's Montel Land and Vodafone's Eurocall. They aim to standardise call rates thus making the notoriously complicated roaming tariffs system easier to understand and more transparent.

The European Commission has taken a strong interest in what it perceives to be high tariffs by launching an investigation to see if operators are abusing their dominant position. All of Europe's operators are being investigated, but it is thought the EC is particularly interested in the big players like Vodafone, Deutsche Telekom and France Telecom/ Orange. The GSM Association has responded by introducing IOTs (inter operator tariffs) which determine the wholesale tariff between roaming partners. Operators are allowed to discount the IOT limit but not surpass it.

Prepaid

The scope for prepaid roaming is still limited by technical constraints but more operators are offering the service. Germany's Viag Interkom and Ireland's Esat-Digifone are using the Logica USSD solution which requires a prefix number. A source at Logica said the Irish GSM-9/18 operator had generated up to 15,000 prepaid roaming calls per month. Logica said more operators were due to sign up to its roaming solution commenting that 'prepaid roaming is really beginning to take off'.

European operators have not been quick to promote prepaid roaming for fear that subscribers who are used to a highly competitive and increasingly cheaper domestic market will want to drive down roaming tariffs by too much too quickly. But as prepaid becomes more popular in Western Europe fewer operators will want to lose out on the new revenue stream. The Swisscom experience suggests subscribers are interested in having prepaid roaming but do not necessarily use it. A source at the Swiss operator, which uses the SICAP solution for roaming, said that in June 2000, 60-70% of prepaid subscribers had activated the service but only 30% of those had actually used it, suggesting the service is an important product selling point, albeit with a small uptake. Usage patterns suggest that prepaid roaming is mainly used by holiday makers calling home and that

'typically a prepaid roamer would call home no more than five times whilst on holiday'. The Swisscom prepaid roamer is generating less income, 'just 5% of all roaming revenues', according to the Swisscom source.

The roaming solutions available at February 2001 are almost exclusively not seamless nor genuinely prepaid. Seamless prepaid roaming with data services will probably not be possible until the implementation of CAMEL Phase 3 technology which, according to Lucent Technologies, operators will be introducing 'in 2002 at the earliest, but more likely in 2003'. CAMEL Phase 3, which looks like becoming the industry standard, will also allow GPRS roaming.

Brokerage

Increased activity is expected in the roaming brokerage sector with small and medium-sized operators looking to cut costs by getting a broker to fix deals. Roaming broker Comfone says large operators will probably always fix the majority of their own bilateral roaming agreements, but smaller operators will be 'attracted to brokers by the possibility of saving up to 50% in administration costs'. Comfone estimates that 80% of the roaming turnover of a particular operator is made with 15 of its neighbouring international operators. It says operators will save significant resources by instructing brokers to make deals with the remainder of operators throughout the world.

Cell site tower sale offers chance to fund 3G deployment

Much attention has been focused on the pitfalls of 3G network deployment and in particular the cost of new infrastructure. However, it seems that a process that is common practice in the - often maligned - US cellular industry may offer relief to European operators who have paid large UMTS licence fees.

In the USA it is commonplace for cellular operators not to own cell site towers and locations across its network, but to rent them. Over the last five years major operators have outsourced cell site portfolio management and since 1998 a number have sold portfolios, and then signed long-term lease agreements with the buyer. This practice is particularly common in the rest of the world.

The US tower industry

The US market has seen five major tower infrastructure providers evolve:

- American Tower
- Crown Castle International
- Pinnacle Tower
- SBA Communications
- SpectraSite.

Crown Castle has already ventured into Europe through its acquisition of the BBC towers and has recently signed agreements with Hutchison 3G, One-2-One and BT; added to this it has towers in Australia with Optus. All of these companies are now exploring the various opportunities within Europe and developing markets such as Brazil. After the recent C- and F-Block re-auctions, business is still to be gained at home in the USA. Whilst the process is in a fairly infant state for Europe, all the tower providers see growth in existing 2G and future 2.5/3G networks.

The business of tower management operates in two key areas. The first is the leasing of towers. This is to a number of parties including: cellular, PCS, ESMR, paging, radio, television broadcasters and government uses. The second area is through ongoing maintenance, monitoring, installation and security service contracts. Approximately 70% of current revenues are derived from rental and the remaining services. However, the split is moving towards a greater share for service revenues.

What do the tower companies actually do?

The tower companies effectively act as facility managers, dealing with every stage of the process from planning through construction to radio installation. As well as constructing new towers, sites are purchased from individuals and from the operators themselves.

Buyer	Seller	When	Towers
Crown Castle	Bell Atlantic	1998	1,427
SpectraSite	Airadigm	Q3 1998	n/a
SpectraSite	Nextel	Q1 1999	2,000
Crown Castle	BellSouth	Q1 1999	1,850
American Tower	AirTouch	Q3 1999	2,100
American Tower	AT&T (long distance)	Q3 1999	1,942
Crown Castle	GTE	Q4 1999	2,322
SpectraSite	SBC	Q3 2000	3,900
SBA	TeleCorp PCS	Q3 2000	213
American Tower	Alltel	Q4 2000	2,193
SBA	US Unwired	Q1 2001	127

Source: Lehman Brothers and EMC World Cellular Database

The average cost of these deals is around $300,000 per tower with all the sellers then signing long-term leases on the sold properties. In most cases the operator also signs a build-to-suit agreement with the tower company, meaning that the tower company plans the network, finds locations, obtains planning rights, builds the tower and potentially installs the infrastructure. The average cost for the whole process is $180,000 (excludes infrastructure costs).

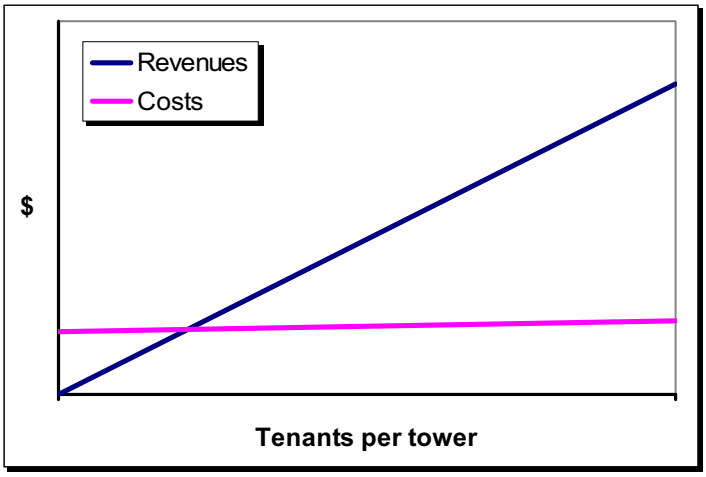
The table above indicates that most major US operators have sold their tower portfolios. The only companies that have yet to sell are VoiceStream, AT&T Wireless and Sprint PCS. All three are expected to sell in the near future. This means that for the tower companies to keep growing their portfolio they have to keep building or buying new towers from areas other than the major operators. New sites can be initiated as part of an operator/ tower supplier deal. This is where a operator requests a tower in a certain location (known as build-to-suit). The other way in which towers are built is through tower company initiatives. As part of a total service agreement offered, tower companies conduct network testing and planning operations. Via this, coverage caps or weak points in operators' networks can be discovered, knowing that operators will need the tower location at some point a tower is constructed with tenants being signed up at a later date. For such locations a premium can often be charged.

How the money is made

The initial capital outlay is fairly high and could be considered a barrier to entry, especially as a tower purchase is around $300,000 and construction $180,000, but with the majority of site purchases a leaseback agreement is often signed, so revenues are guaranteed for lengthy periods. Each tower owner aims to have multiple tenants on its tower. Large towers can accommodate up to six or seven operators. Naturally the greater the number of tenants on a tower the greater the revenues. The revenue per tenant is up to $25,000 per annum. However, the increase in tower tenants does not have the same constant

increase for costs, as these only rise minimally with the addition of new occupants. Costs such as security and maintenance remain fairly static regardless of the number of operators on a tower.

Tower revenues

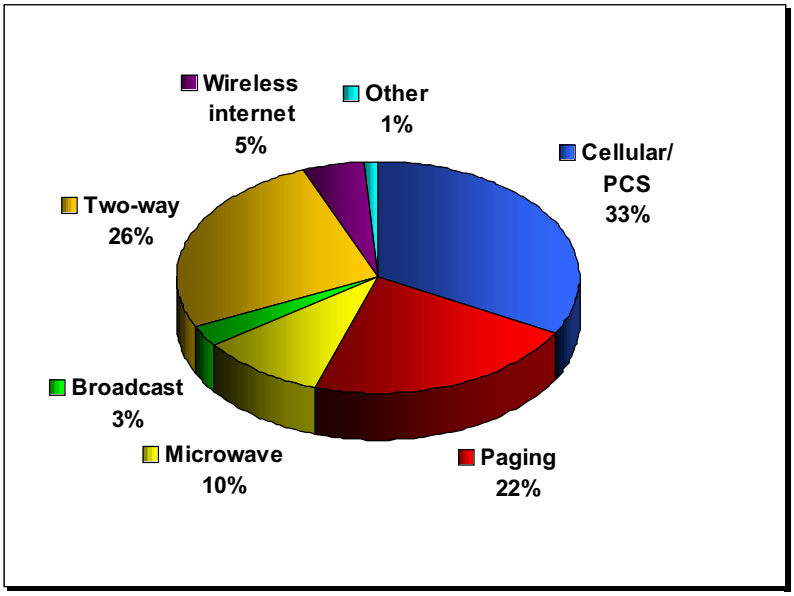


Source: EMC Research

The tower industry companies aim to have around 3.5 tenants per tower, within a time period of 3-5 years.

How many towers are there?

According to Fryer's TowerSource there are around 83,810 active towers in the USA, with around 33% being used for cellular and PCS activities.



Source: Fryer's TowerSource

The five major tower companies own around 30,000 of these deployed sites and as previously indicated the majority of these were acquired through operator purchases. It is the operators that continue to supply the tower companies with revenue. The six major US operators (Verizon Wireless, Cingular Wireless, AT&T Wireless, Sprint PCS, Nextel

and VoiceStream) account for around 85% of revenue and tenants. Therefore the continued growth in existing network coverage and capacity is key to tower company growth.

Despite 3G network deployment still being a considerable way off, it is perceived that large growth within the domestic market is still obtainable. The recent C- and F-Block re-auction will see large areas of greenfield spectrum developed and, with cell coverage smaller in 1900MHz, the requirement for cell site locations will be greater. The 700MHz auction is to be in Q3 2001 and the potential for totally new companies to cellular/PCS is possible. If such a company won spectrum it would no doubt want to deploy its network rapidly and would need access to a network of towers. Existing 2G 800/1900MHz networks continue to expand and grow and, with a large number of towers still owned by operators and by smaller entities (often called 'Mom and Pop'), room for expansion remains in this area.

Why do companies opt to outsource?

Cell site towers and the locations of towers have often been thought of as assets and to sell them is a foreign idea. However, the opportunity to raise capital through the sale, and the ability to track and monitor costs when network services are outsourced, was seen as a popular one. SBC recently raised $1.56 billion and Alltel around $700 million from tower sales.

The process of tower construction is, as previously described, very segmented with expertise in many fields required. This is expertise that operators often do not have or the area is not seen as a priority. By outsourcing the 'nuts and bolts' of the network, resources can be reallocated to more core areas, such as marketing. The tower companies gain benefit from local information in areas such as planning and community knowledge, added to this are the economies of scale for construction and material costs.

Competition/problems

The segment has matured and the big business is split between the five mentioned companies. With issues such as planning and high initial capital expenditure the barriers to entry for new companies are quite high, but once established the market is fairly stable. Operators sign long lease deals to guarantee revenue and as most operators use a whole network of towers it cannot leave individual locations. This would create a major reshuffle of the network and obviously a major expense. For this reason the amount of operators churning off towers is very low, typically lower than 1%.

Competitors include network service suppliers, companies such as WFI and LCC. Unlike the tower companies these do not construct and acquire sites, instead opting for network planning and services. In some cases the service suppliers are clients of the tower suppliers, the tower company effectively acting as a landlord. Whilst the offerings of these companies is similar, they are not identical. The managing, planning and monitoring of the network is the key area of an operator's business and if a network fails then ultimately so will its business. For these reasons service suppliers are in a less secure position and operators in a stronger position to cancel agreements.

The issue of planning, or zoning as it is known in the USA, could easily be perceived as a problem. The environmental and political issues surrounding the erection of cell site masts are contentious worldwide. In the USA the phrase 'nimby' ('Not in my back yard') has developed. However, the tower companies see the issue of zoning as an ally, acting as a massive barrier to entry. The companies build up historical and personal relationships with zoning authorities and gain specific knowledge about the process. Between 95% and 99% of applications are approved.

Cost escalation is minimal with the addition of tenants and, with location leases longer than operator leases, rental revenue is well protected. Most companies are trying to replace land lease agreements with purchases, but this is not always possible, especially when towers are located on buildings, rooftops, water towers, churches etc. The development of technology may one day reduce the number of sites and antennas required. However, the development of one antenna handling multiple operators is thought to be some time off.

Europe

The cost of 3G networks has been estimated to be as much as licence expenditure, with some parties forecasting a cost of around EUR 120 billion to cover Europe's 385 million POPs. It is widely accepted that the introduction of UMTS networks will require a greater number of BTS. The higher frequency of UMTS will lower both the propagation of waves and reduce cell sizes in 3G networks. The exact increase in BTS is yet to be confirmed, but in trials conducted by WFI in Amsterdam the increase from 2G to 3G BTS was a multiple of between three and four. The 3G network trials were with an unnamed operator, but to cover the same area as the existing 2G network (47 BTS) 176 BTS were needed to reach data rates of 2Mbps and for rates of 350-400kbps 106 BTS. This was after nine network plans were tested. Whilst the exact increase in BTS requirements will remain uncertain until networks are deployed and commercially operational, it is clear that many more cell site locations are going to be needed.

As a consequence, existing and new tower locations are going to become more sought after, especially to new entrants. Regulators in The Netherlands and Belgium are already stipulating that operators are to share towers. It is unlikely that competitors are going to want to pay money to each other, and to have a crucial network equipment on each other's property. It is therefore logical and more likely that a third party, such as a Crown Castle or American Tower, becomes involved.

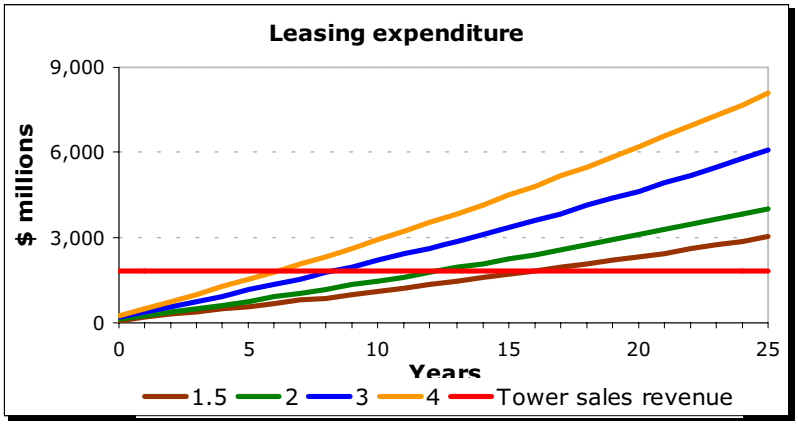
What if European operators sold towers?

The four UK operators currently have around 6,000 cells sites each. If the decision was made to realise these assets an operator could be expected to raise around $1.8 billion. This is based on the US average of $300,000 per tower sold. Each of the five UK 3G licence winners paid $7.1 billion on average for UMTS opportunities. Since winning licences in April 2000 all five have received much attention on how the licence fees and network expenditure would be recouped; no doubt $1.8 billion from existing assets would be a welcome start.

Any money raised would not necessarily be free for licence payment or network roll-out. Operators would then have to lease back the towers to continue operations and, with the number of sites needed for 3G networks likely to be much higher, the number of leased sites would be greater than that of the sold properties.

The following chart shows the cost comparison for selling towers against leasing them, it assumes certain key criteria:

- 6,000 towers sold at $300,000 per tower
- 1.5, 2, 3 and 4 indicate the multiplier in cell sites from 2G to 3G, for example 1.5 multiplier equates to 9,000 towers for a 3G network
- All towers deployed at launch (year 0)
- Annual rent of $10,000 per cell site at 2% year on year rent increase.



Source: EMC Research

Whilst this is a fairly basic assumption it demonstrates the possible savings through selling and leasing back towers. It also does not take into account the possible expenditure savings on new towers. Most tower company and operator agreements have build-to-suit options: any new towers would logically be supplied and built by the tower company meaning all the operator would pay is the ongoing rent, with the tower company paying for the new site. It also will allow the operator time to recover revenues from the 3G networks without having to pay everything upfront. For example, if 12,000 cell sites were needed for the 3G network it would take approximately 10-15 years before the revenue gained through tower sales exceeded the rent.

On average a new cell site in the USA costs $180,000: the figure is likely to be less in Europe and for 3G networks. 3G cell sites are more likely to be deployed as part of micro-networks with base stations fitted on various existing structures, and towers built generally smaller than 2G predecessors. Depending on the exact number and location of cell sites an operator could save anything upwards of $300 million.

European opportunities

As operators and vendors alike have begun to realise the potential costs for future networks, outsourcing is becoming a far more viable option. Where a company was previously very vertical in its operations, it is now looking more horizontal, choosing to use experts and third parties for areas of its business. Examples of this include Ericsson outsourcing its handset manufacturing and Tele2/Telia sharing UMTS costs.

Companies looking to exploit potential in the European market are likely to include US players, Crown Castle, SBA and SpectraSite as well as more local companies like TDF, NTL and Towercast.

Microsoft to enter wireless phone business

At the 3GSM World Congress in Cannes, Microsoft announced plans to launch software aimed at multimedia-enabled handsets that leverage its Windows-based software, with the smartphone platform, codenamed Stinger. The platform is built on a version of its Windows CE 3.0 operating system, specifically optimised for mobile phones to extend battery life and reduce memory requirements. The company expects Stinger-based phones to require eight megabytes of memory. Microsoft will not sell Stinger itself but will provide a reference model to original equipment manufacturers. Stinger was first demonstrated at the Telecom 99 trade show.

The device has a colour screen for displaying text and images, and applications include the ubiquitous calendar and address book. It also features the mobile Explorer micro-browser, and a mobile version of Outlook which lets users synchronise the exchange of data between Stinger and a remote server. The first products using the Stinger technology are expected on the market in 2001 and Samsung has already signed up as a manufacturer, with Mitsubishi also expressing its commitment to using Stinger in its web-enabled handsets. UK-based handset manufacturer Sendo demonstrated the first colour prototype of its Z100 smartphone using the stinger platform.

Bluetooth 'on time' as companies pool efforts

The Bluetooth Special Interest Group (SIG), which was founded by some of the world's major telecommunications companies (3Com, Ericsson, IBM, Intel, Lucent, Microsoft, Motorola, Nokia and Toshiba), now has 2,165 members. All of these members are committed to bringing Bluetooth to market. Too much capital has been invested, by too many companies, for success not to be universally sought, say those involved. Bluetooth's greatest asset, at present, is the common goals that exist between members of the SIG, which serve to focus the manner in which Bluetooth is brought to market. Whilst everyone acknowledges Bluetooth could proliferate the future market, other considerations will reign in enthusiasm and temper launch dates.

At this moment in time, expectation is Bluetooth's main danger. WAP fell into the same trap and has yet to recover. It is clearly accepted that Bluetooth has a huge potential: the snowball has begun to roll and people are no longer talking about wireless connections between PCs, terminal handsets and printers. Now discussions are about implanting Bluetooth chips into cargo crates so that trucks automatically know which ones to pick up and fridges inform a terminal handset to order food over the internet. It seems that all our problems will be solved by the universal solution called Bluetooth.

To compound this situation, there are some parties that would like to see Bluetooth become all things to all people immediately, or else they would like to bring to market the services they want to offer (but which the public may not want). The key to introducing Bluetooth will be to do it slowly, whilst bearing specific applications in mind. This consideration needs to be understood if Bluetooth is to be a success in its early days. All parties have to concede that the introduction of Bluetooth-enabled devices must be tactfully handled. Simplicity, desirability and seamless functionality are key criteria that must be met.

The timescale of Bluetooth

Some companies are in a position to ship Bluetooth-enabled devices today, but the level of technological development is not yet at its height. To back this up one only has to consider that ETSI has not yet published Bluetooth's test standards and as yet has no timescale in which it will do so. It is known that some companies have been conducting tests with existing processors and existing 2.4GHz chips, rather than waiting for specifically designed components.

Shipping now would gain companies a 'first to market' edge, but future developments could feasibly put them in a long-term disadvantageous position. Rather, companies are holding back (whether voluntarily or involuntarily - due to a shortage in components caused by Bluetooth's infancy), showing conservative tendencies and seeking to promote interoperability and reliability. This is a prime example of those companies in the SIG sharing common aims.

The first Bluetooth products are due to hit the market towards the end of 2001, but these will be limited in their volume and range (of applications). Prices will be high. The feelings

amongst exhibitors and delegates who attended the 3GSM Congress in Cannes (February 2001) is that widespread availability of Bluetooth devices will not be seen until the end of 2002 at the earliest. When questioned about whether availability of chipsets and software could delay the arrival of Bluetooth-enabled products (in a similar way that GPRS handsets are being held up and W-CDMA services are likely to reach market later than first predicted), EMC was told that this was unlikely.

At present the demand for Bluetooth chips cannot be met, simply because the chip manufacturers do not have the support resources to manufacture large numbers. At present, production is running at tens of thousands per month. However, there are several factors as to why the advent of Bluetooth is unlikely to be held up by availability of chipsets and software. Firstly, companies are working together and the necessity of incorporating the chip, software and application means that no one part can go to market as the finished product without the others. Secondly, a lot of resources are being put into developing Bluetooth from a lot of different companies and the universal desire to launch a working product should see the technology brought to market without much delay. The software companies are not constrained by the same problems as have beset the chipset manufacturers, and these latter companies are predicting the production of millions of chips per month by the middle of 2001.

Whether any other factors arise which could delay the onset of Bluetooth remains to be seen. Already we have had an alteration in the standard used (from Rev 1.0 to Rev 1.1) and there are new specifications coming through for the interface between the baseband controller and the RF chip which will make system integration simpler.

Companies involved with Bluetooth have a very positive outlook regarding its eventual mass market presence. Once Bluetooth products are widely available, and once prices fall to a level that attracts consumers, sales of Bluetooth devices are predicted to 'explode'. Exactly when this will occur is open to debate, but the industry does not waste time arguing that it will happen, in their eyes it is just a question of when. It could well be that Bluetooth's timescale coincides with the arrival of GPRS and W-CDMA services, a factor that would see a powerful triumvirate emerge.

Bluetooth representatives at 3GSM World Congress, Cannes:

- 7Layers

Product development, testing, studies, technology training. 7Layers has been involved in Bluetooth's testing and qualification programme from its earliest days. The company offers tailored protocol testing solutions in Ratingen, Germany. 7Layers assists its clients in bringing Bluetooth products to market. Due to its nature, the company had little to display on Bluetooth at Cannes and chiefly promoted its expertise in its chosen area.

- Agere

Microelectronics, specifically semiconductors. Agere is seeking to develop Bluetooth solutions and has achieved Bluetooth qualification for its single component radio frequency subsystem. Bluetooth was not a major element of its stand, though the company assists its clients to bring Bluetooth technology to market rapidly.

- Intel

Intel demonstrated and discussed personal connectivity. It had on display a wireless headset, but was not able to demonstrate the device. The main thrust of its Bluetooth presence at Cannes was focused on pushing towards a 'gentle launch', it is not striving to

make the technology a universal solution from day one. It was looking towards the future and enthusiastically believes that Bluetooth will reach a point from where its use will explode. As one of the founders of the SIG, Intel's comments cannot be dismissed lightly.

- Plextek

Electronics design consultants. Plextek provides independent design consultancy for Bluetooth products, covering all points from initial study to volume manufacture. The company handles Bluetooth solutions for a wide range of applications, including LAN, office and telephony. Plextek is collaborating with silicon vendors to produce a Bluetooth chip which will cost only $5.

- TTPCOM

Technology supplier for digital wireless communications (including GSM, GPRS, WAP and Bluetooth). TTPCOM had on show at Cannes its Bluetooth solutions based on the 1.1 specification. This comprised two products, firstly a baseband controller core in VHDL and Link Controller, Link Manager and Host Controller Interface software in ANSI C. Secondly, TTPCOM also demonstrated a host protocol stack. TTPCOM's products support scatternet and point to multipoint connections; the technology has already been sold to Alcatel and Anritsu.

- Tektronix

Test and measurement instrumentation, software provider. Tektronix did not have any Bluetooth devices to demonstrate at Cannes, though it did display several of its other products which provide the technological backing for Bluetooth implementation. Tektronix sells devices which test Bluetooth applications.

EMC World Cellular Review

At a seminar to launch the EMC World Cellular Review (available on CD-ROM from EMC) Managing Director Julian Herbert delivered mixed news for the GSM world: with a subscription base of more than 440 million worldwide at the end of 2000, GSM networks now represent more than 60% of the cellular wireless world. Despite this leading position, GSM operators do not dominate the list of the world's biggest 10 mobile internet subscriber bases. NTT DoCoMo (PDC), KDDI, J-Phone, LG Telecom and KT Freetel (CDMA) are the top five, with over 30 million mobile internet users in total. The biggest GSM mobile internet user base is BT Cellnet in the UK, with between 1.2 and 1.5 million.

The EMC World Cellular Review is a powerful market overview containing over 200 Powerpoint slides, together with data provided in Excel format. The slides provide regional, technological and forecast summaries. At the launch in Cannes Julian Herbert demonstrated that basic voice and 2G applications still provide substantial opportunities for growth.

Presenting the Regional Focus of the EMC World Cellular Review, Head of Forecasting and Analysis, Michèle Scanlon presented overviews of the market players and opportunities in Brazil, India, Nigeria and China. The proposed moves from TDMA to GSM were examined and set in context of the impact on the GSM market in Latin America.

The presentation concluded with a series of EMC's statements on the future of the cellular world:

- Despite prominence given to data, voice still dominates in respect of revenue and growth
- Over the next two years (China, Central Europe, Latin America, Africa) second, third and forth centile countries will dominate subscriber growth
- Emergence of the 'regional player' with consolidation in regional hubs
- Ongoing consolidation amongst major players creating pan-regional/global strategies
- Consistent with EMC's statement made at the GPRS Congress (May 2000), GPRS handsets will not ship in volume until H2 2001
- CDMA 1x will ship in volume from Q4 2001
- Full W-CDMA service will not be available until Q1 2003, due to the late availability of handsets (from late Q4 2002).

Country Reports

Austria

Date	Subscriber
Q3 1999	3,627,870
Q4 1999	4,215,650
Q1 2000	4,586,000
Q2 2000	5,130,840
Q3 2000	5,539,900
Q4 2000	6,150,000

Connect Austria outperforms rivals to increase market share

Connect Austria's ONE network has outperformed its competitors in gaining a significant share of the GSM market in 2000. The GSM-1800 operator that launched Austria's third network in October 1998 increased its market share by over 7% in 2000 to the detriment of the two established networks Mobilkom and max.mobil.

Operator	Market share YE 2000 %	Subscribers YE 2000	Market share YE 1999 %
Mobilkom	45.53	2,800,000	53.03
max.mobil	34.15	2,100,000	35.58
Connect Austria	18.7	1,150,000	11.39
tele.ring	1.62	100,000	not open
Totals	**100**	**6,150,000**	**100**

Operator	Subscribers YE 1999	New subscribers 1999-2000	New subscribers 1999-2000 %
Mobilkom	2,235,650	564,350	29.18
max.mobil	1,500,000	600,000	31.02
Connect Austria	480,000	670,000	34.63
tele.ring	not open	100,000	5.17
Totals	**4,215,650**	**1,934,350**	**100**

Source: EMC Research
(Mobilkom subscriber figures include analogue network with 150,000 subscribers at YE 2000)

Connect Austria gained 70,000 more subscribers in 2000 than the next best performing operator max.mobil. Mobilkom, although still the clear market leader by over 10%, performed worst of the three main operators picking up under 30% of new subscribers. tele.ring, which launched in May 2000, reached its end of year target of 100,000 subscribers. Connect Austria said its ONE network outperformed its competitors by providing well researched innovative products as well as good customer care. It cites the following developments as key to its success in 2000.

- March: the launch of HSCSD with speeds of 28.8kbps (the first in Austria)
- March: introduction of virtual private networks (VPN) for business customers
- April: ONE gets additional GSM frequencies with extension of frequency spectrum by 2 x 5.7MHz to 2 x 22.5MHz
- September: reductions in some tariffs, but also increase in connection and SMS costs
- September: introduction of customer loyalty programme ONE FOR ME which rewards subscribers with handset subsidies and other special offers
- October: first mobile chat room in Austria introduced
- October: roaming agreements made with 204 networks in 101 countries
- December: TAKE ONE Quickload prepaid recharging facility introduced.

Such has been the success of Connect Austria ONE's products that Mobilkom and max.mobil applied in January 2001 to the Vienna Commercial Court for an injunction against the All in ONE package offer citing unfair competition.

The high penetration rate of 75.5% in Austria at December 2000 (EMC Research) suggests that the market is reaching saturation point. Connect Austria has said in 2001 it is concentrating on 'subscribers who offer better value' and on customer care. Although ONE historically has had a subscription rate of just under 50% prepaid, it now says 60-70% of all new subscribers are postpaid. It is also planning to open a second customer call centre by June 2001. It believes the introduction of GPRS during the first quarter of 2001 will further strengthen its market position. The operator is not making any predictions for market share for the end of 2001.

Connect Austria launches GPRS

Connect Austria's ONE network has announced the launch of GPRS services with speeds of 20-40kbps (with speeds of 40-80kbps by the end of 2001). ONE is charging a monthly subscription of ATS 99 which includes 10MB of data downloaded from the internet and 100KB worth of WAP pages. Additional data costs ATS 14 per MB for internet data and ATS 0.35 for WAP data. ONE said 10MB per month on the internet corresponds to approximately 3,000 to 4,000 emails or 600 to 800 websites, depending on data volume and content. It added that a 100KB would allow 80 to 120 WAP pages to be accessed. ONE is offering the Motorola Timeport 260 at ATS 1,999. ONE also confirmed the signing of GPRS roaming contracts with Viag Interkom in Germany and Czech Eurotel. In April 2001, the GSM-1800 operator will offer ONE Cost Control which will enable subscribers to check GPRS costs via their handset.

In a related development, ONE has entered a GPRS roaming agreement with Viag Interkom. Viag Interkom subscribers roaming in Austria will pay a roaming charge of DEM 0.20 per 10KB of volume on top of the home GPRS tariff (DEM 0.09 per 10KB and DEM 0.49/day for online time). On 1 May 2001, roaming subscribers from both networks will be able to access their home WAP service via GPRS. Viag subscribers in Austria will have to pay DEM 0.05 per downloaded WAP page on top of the national charge of DEM 0.09. Viag said no adjustments to handsets were necessary to allow roaming. The GSM-1800 operator said it was planning other joint ventures in the first half of 2001 with other BT Cellnet affiliates including Telfort, Esat-Digifone and BLU.

Belgium

Date	Subscriber
Q3 1999	2,631,200
Q4 1999	3,192,800
Q1 2000	3,564,000
Q2 2000	4,010,500
Q3 2000	4,725,000
Q4 2000	5,577,000

UMTS auction ends with low bids after one round

The Belgian Government has sold three UMTS licences to the country's three incumbent GSM operators at the minimum bidding price, raising a total of EUR 450.2 million. Only three operators, Mobistar, KPN Orange and Proximus, bid for the four available licences. They each paid EUR 150 million apart from Proximus which paid EUR 150.2 million. The auction was the latest in a lengthening list of disappointing auctions for national governments.

Telecom Italia and Belgacom alliance?

Telecom Italia and Belgacom are said to be in the early stages of a possible alliance, though a spokesperson for the Italian operator has denied the report. However, Belgacom has commented that current discussions are a 'shareholder issue' and left this an open-

ended statement. It has been known that the operator and the Belgian Government (which holds a 50.1% stake in Belgacom) have been looking for an international partner. It has been mooted that Telecom Italia may make a bid for Belgacom, but a source close to the proceedings said that the Italians are actually less anxious to strike a deal than the Belgians are. However, any deal is unlikely to surface until the Belgian UMTS licences have been awarded in March 2001.

Benefits for the two companies would include:

- Increased negotiating power when dealing with equipment suppliers
- An enhanced ability to capture revenue from cross-border roaming calls
- Technology sharing
- A larger audience for French-language internet content.

The deal would also improve Telecom Italia's position in Europe, though it would still leave it short of the UK and German markets.

Bulgaria

Date	Subscriber
Q3 1999	258,520
Q4 1999	329,560
Q1 2000	388,130
Q2 2000	457,220
Q3 2000	570,710
Q4 2000	737,990

TETRA tender planned

The State Telecommunications Commission of Bulgaria has announced that it is to hold a tender for the right to provide a TETRA-based public radio system. The commission plans to offer a 15-year licence with the initial price set at $2 million and bidding increments of $250,000. The system would be designed to offer improved communications for the emergency services.

Croatia

Date	Subscriber
Q3 1999	282,500
Q4 1999	391,570
Q1 2000	478,480
Q2 2000	656,830
Q3 2000	783,500
Q4 2000	936,000

Plans for a third GSM and three UMTS licences

The Croatian Government is planning to offer three UMTS licences in 2001. The UMTS licences will be offered after the award of a third GSM licence. The GSM licence offer is planned for Q2 2001 with UMTS offers taking place in Q3-Q4 2001. The State Telecommunications Ministry announced that the UMTS licences will be determined by auction with a minimum price set by the regulator. To date two local utilities and TIW of Canada have expressed an interest in UMTS licences.

Denmark

Date	Subscriber
Q3 1999	2,397,430
Q4 1999	2,619,000
Q1 2000	2,772,250
Q2 2000	3,073,800
Q3 2000	3,320,700
Q4 2000	3,478,320

Government plans sealed UMTS auction

The Danish Government plans to hold a sealed bid auction for four licences to operate 3G mobile networks in Q3 2001. A sealed bid auction would be the first of its kind among European countries which have so far tendered for 3G licences.

The Government will set a reserve price for the licences and it estimated the value of each licence at around DKK 500 million. Judging from previous European UMTS auctions, Denmark could well be too optimistic in hoping for an aggressive new entrant to outbid existing operators. Most recently, Belgium only received three applications for its four licences and earlier Italy, Austria and Switzerland all suffered a shortfall in forecast UMTS revenues as bidders refused to pay hefty costs for uncertain returns.

Finland

Date	Subscriber
Q3 1999	3,252,980
Q4 1999	3,367,500
Q1 2000	3,478,370
Q2 2000	3,639,880
Q3 2000	3,752,150
Q4 2000	3,823,540

Growth in handset sales slowing down and stabilising

Between 70 and 80% of mobile handset buyers in Finland already own a mobile handset. According to the Finnish Electronics Wholesalers' Association, only about one in four mobile handsets sold in Finland end up with a customer who does not already have a cellular handset. This conclusion, though, is not very surprising, considering the fact that Finland has the world's highest per capita use of mobile telephony. Consequently, more people in Finland are trading in their existing models for new ones than in most parts of the world. Nokia estimates that between 40-50% of mobile phone buyers are replacing an old device. In the coming years, Nokia expects this to increase to between 70 and 80% in other countries as well.

According to industry estimates, consumers exchange their mobile handsets for new models every two to three years. The trend is boosted by the fact that each successive model has new and more developed features. The technical developments create new markets, and a mobile phone user who wants to stay on the cutting edge of cellular technology will have to replace a WAP telephone bought today about two years from now. Another factor encouraging the trend is that mobile telephones have become fashion items which reveal a good deal about their users. According to estimates from the Electronics Wholesalers' Association, about 1.4 million mobile telephones will be sold in Finland in 2001, which is exactly the same as a year ago, even though sales in January and February rose by 17% over the same time last year. Nevertheless, the constant growth in mobile handset sales, which continued throughout the last decade, appears to be coming to a halt.

Nokia is the most widely sold brand of mobile handsets in Finland where it has a market share of about 80%. The remaining 20% of the market is divided almost equally among Ericsson, Motorola, Siemens and Panasonic. The Finnish manufacturer Benefon has a very small share of the market.

If the assumption that mobile handset users upgrade to a new model every two or three years is correct, mobile handset sales in Finland will remain stable at about 1-1.5 million handsets a year. A spokesman from the Electronics Wholesalers' Association. further stated that the average price of mobile handsets is unlikely to go down any more because of the technological advances in each successive model.

DNA attracts 18,000 subscribers in first month

New mobile operator DNA, which launched its services at the beginning of February 2001, has already attracted around 18,000 subscribers. According to the operator, at the current rate, it would reach its target of 170,000 subscribers by the year end. Around half of the new subscribers are private consumers.

Benefon introduces new NMT-450 product

Benefon has released a new NMT-450 product, the Benefon Exion. Weighing only 109g and 100mm in length, it is the lightest and smallest NMT-450 handset ever made but it still offers a full 1,200mW transmitter power for extended range when needed. Other top features of the Exion include silver or ruthenium metal cover, extensive personal organiser functions and vibrating alert.

There are three different hands-free kits for this product, including an extensive hands-free car kit with voice recognition function for safe dialling and answering while driving. All handsfree car kits and the chargers for the Exion are the same as for the internet handset Benefon Q. This enables a flexible vehicular use of both Exion and Q for companies in markets where a mixed use of NMT-450 and GSM services often is the best overall solution for an organisation. The availability of the Exion is targeted to begin in April 2001 and it will keep the NMT-450 business as an important contributor to the sales and the result of the company even when the main responsibility for the revenue and result growth is shifting into the GSM and GSM/GPS wireless instruments domain.

Sonera's strategy in question as it searches for a partner

Once considered a crown jewel within the telecom sector, Sonera has seen its shares slide dramatically from an all time high of more than EUR 90 last spring to EUR 16.35 this February. Having failed to keep up with the cross-border acquisitions of its larger European rivals, Sonera had lofty ambitions on becoming a global mobile operator through joint ventures outside its domestic markets and by strategically carving out a technological niche for itself in the provision and development of mobile-based value-added services. Though the company is not alone in the equity market turmoil that has affected just about every mobile operator in the technology sector, one cannot help asking: What went wrong?

The problems appear to stem largely from the scale of Sonera's ambitious investment in UMTS licences, the erosion of its once highly held technological competitive advantage over its rivals and its failure or inability to find an international partner to boost its standing in Europe and internationally, after having announced almost a year ago it was in talks with six potential European operators.

Exposure to 3G investments

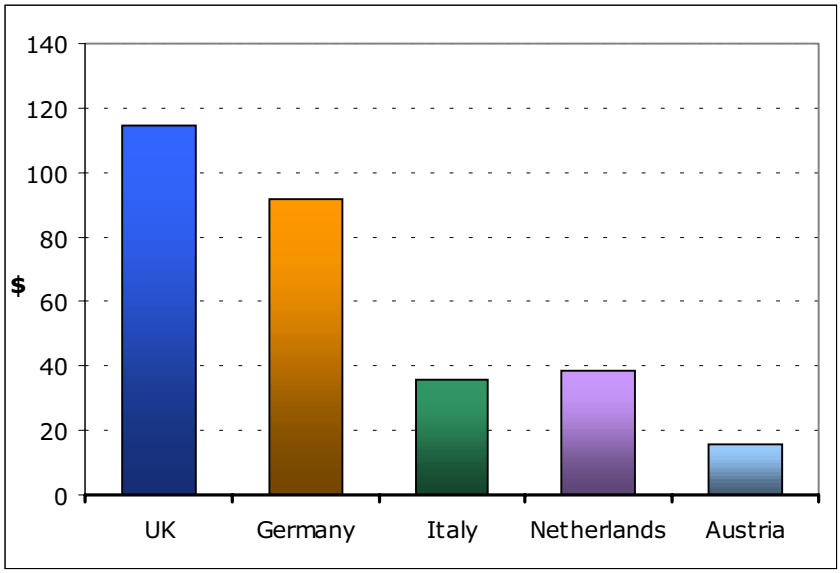
The recently published financial statement for 2000 revealed that Sonera's debt capital had grown significantly over the past year, with interest-bearing debt now totalling FIM 34.5 billion (EUR 5.85 billion) as compared to FIM 7.7 billion the previous year. The company paid out about EUR 4.0 billion (FIM 24 billion) for four European UMTS licences (not including its Finnish licence) and estimates its share in financing operations of these four joint UMTS ventures will amount to between FIM 30-36 billion (EUR 5-6 billion). In the view of market analysts, Sonera's debt load with respect to UMTS licences is not unique, but in comparison to its other European rivals, the company is small, thereby raising its risk profile.

Country	Operator	Licence term
Germany (42.8%)	Group 3G	20 years
Italy (12.55%)	IPSE	15 years
Spain (14.25%)	Xfera	20 years
Norway (50%)	Broadband	12 years

Source: Sonera's financial statement 2000

The hefty EUR 8.4 billion price paid for the German UMTS licence in partnership with Telefonica has been the major focus of concern. Calculated by price per POP, the auctions in Germany and the UK have turned out to be the most expensive in comparison to fees paid out in other European countries where UMTS licences were also awarded.

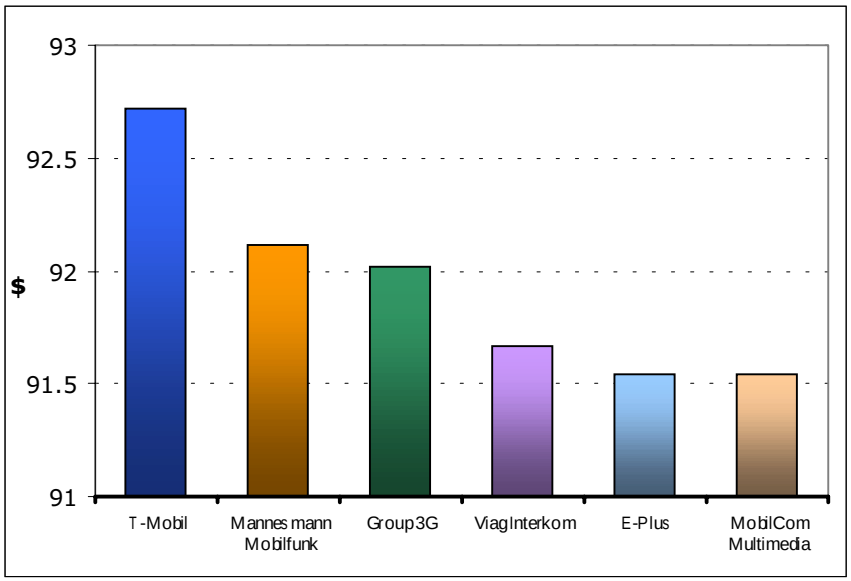
Average price per POP



Source: EMC World Cellular Database

In a recent interview with Finnish business daily Taloussanomat, chief executive Kaj-Erik Relander admitted that, in the light of current market events, Sonera should, in retrospect, probably have settled for a smaller 3G stake in Germany.

Price per POP paid for German 3G licence



Source: EMC World Cellular Database

Recent reports in the Finnish daily, Helsingin Sanomat, of turmoil within the company's management over its future UMTS strategy have gained credence. According to the report, the problem revolved around new president and CEO Kaj-Erik Relander's inability to establish a clear strategy for the company, though Sonera strongly denies any crisis among its management as regards future strategic direction. The rumours have gained intensity with the recent departure from the company of Pirjo Kekalainen-Torvinen, senior vice-president for Sonera International Mobile, regarded as the company's 3G strategy architect. Earlier signs of wavering have also been obvious in its UMTS strategy. In October 2000, it announced it intended to reappraise its UMTS strategy: concentrating on licences granted already, the Baltic region and selected stakes in other European markets. In this regard it has been trying to reduce its stake in its German 3G consortium, but is yet to find a prospective buyer for 23% of its 42.9% stake. The main hurdle appears to be the asking price.

With its credit ratings low, and venture capital tight, the company intends to finance the repayment of its UMTS licence investments, which were short-term loans, by selling its 2G stakes in other companies, as well as in part through the licence holding company's own non-recourse financing. The disposal strategy has already begun with the sell-off in July 2000 of 10% of its holding in Turkcell, and the sale of its assets in American mobile operators VoiceStream and Powertel to Deutsche Telekom, yet to be finalised pending regulatory approval.

Technological advantage

Once held up as a technological pioneer in the provision and development of mobile-based value-added services, for which its shares commanded a premium, the fast pace of technological development within the global mobile sector appears to have caught up with Sonera. It can no more boast the technological edge it once held over rivals, largely through its mobile data encryption unit Smart Trust and mobile internet portal Zed. Long-held plans to publicly list these two units have now been pushed back, subject to market conditions.

The search for a strategic partner

With the market consolidating, and having realised it is too small to survive on its own, Sonera's continued search for an international partner is still ongoing. Deutsche Telekom and Orange have for a long time been named among those keenly interested in Sonera, but nothing has materialised. A potential merger will undoubtedly increase its financial muscle and broaden the potential customer base for Smart Trust and Sonera Zed.

Though the company's management persists in feeling Sonera would be one of the future surviving operators in the global telecom industry, the company's current predicament prompts the question: What's the future for Sonera? No matter how swiftly Sonera's management moves to tackle its problems, under the present market conditions, it is going to be an uphill task.

France

Date	Subscriber
Q3 1999	15,977,310
Q4 1999	20,305,800
Q1 2000	22,267,500
Q2 2000	23,845,000
Q3 2000	25,696,400
Q4 2000	29,052,300

ART study shows GSM service deteriorating

The quality of service offered by France's three GSM networks has in many cases deteriorated between the period 1999-2000, according to research commissioned by the French regulator ART. The research looked at the percentage of two-minute long calls which were successfully completed in a number of test situations. The tests giving the 2000 results were carried out by the research company Thales Idatys for ART under the following conditions:

- More than 18,000 calls were made over four weeks during the period 13 November 2000 to 8 December 2000
- Calls were made in 100 towns of between 50,000 and 400,000 inhabitants, and in 12 towns or cities of more than 400,000 inhabitants at peak and off-peak times
- A variety of conditions were tested including: in cars, on foot inside and outside buildings, on trains
- There were 33% of calls from fixed lines to mobiles and 67% of calls from mobile to fixed lines
- Calls were made using two types of dual-band handsets for each network:
  - France Telecom Itineris: Nokia 3210 and Alcatel One Touch
  - SFR: Sony CD5 and Panasonic GD 90
  - Bouygues Telecom: Nokia 3210 and Siemens C25.

	In a car		On foot outside	
Successful 2 minute calls %	1999	2000	1999	2000
Itineris	96	95	96	95
SFR	96	96	97	98
Bouygues Telecom	98	96	97	98

	On foot inside		On suburban train	
Successful 2 minute calls %	1999	2000	1999	2000
Itineris	93	94	82	81
SFR	96	96	84	81
Bouygues Telecom	92	96	78	75

Calls made in large urban areas with more than 400,000 inhabitants (Paris, Lyon, Nice, Marseilles etc)
Source: ART

In 2000 SFR performed best in the four test situations carried out in large urban areas with an average percentage score of 92.75% compared to 91.25% for Itineris and Bouygues Telecom. SFR maintained or increased its percentages from 1999 to 2000 in each situation apart from on suburban trains where it decreased by 3%. All three operators had decreasing network performance on trains with Bouygues reporting a disappointing 75%, suggesting this is a problem area for operators. Itineris only managed to improve its performance in one test situation, on foot outside buildings. Bouygues improved in the two pedestrian categories.

Successful 2 minute calls %	In a car 1999	In a car 2000	On foot outside 1999	On foot outside 2000
Itineris	98	95	97	98
SFR	98	97	98	97
Bouygues Telecom	96	95	98	96

Successful 2 minute calls %	On foot inside 1999	On foot inside 2000
Itineris	94	98
SFR	96	96
Bouygues Telecom	94	96

Calls made in towns with populations of between 50,000 and 400,000
Source: ART

Itineris performed best in 2000 in the smaller towns averaging 97% over the three test situations, compared to 96.66% for SFR and 95.66% for Bouygues. All three operators showed a worse performance in the car situation, while Itineris was the only operator to improve in both pedestrian test situations. The research as a whole suggests that Bouygues is marginally the worst performing of the three operators in 2000 with SFR performing statistically around 0.05% better than Itineris. ART said that all the operators were making improvements to their networks which could result in dips in service. The increase in the GSM penetration rate in France from 34% to 48% has also clearly affected the overall performance of the operators.

Prepaid handset prices - February 2001

Bouygues Telecom has been undercutting the French prepaid market in February 2001, by offering Nomad and Spot phone kits for as little as FFR 199, around FFR 300 cheaper than most of the deals offered by France Telecom's (Itineris) Mobicarte and SFR's Entrée Libre.

Bouygues Telecom

Bouygues has two prepaid products, Nomad and Spot, the latter of which offers cheaper calls if the caller and person being called accept 10-second advertisements every 90 seconds. Nomad prepaid handset kits start at FFR 199 going up to FFR 899 with a calling credit of FFR 96. Spot kits have a calling credit of FFR 37. Both products offer SIM card only deals at FFR 250 with a FFR 96 calling credit for Nomad and 45 inclusive minutes with Spot. Nomad cards can be recharged with FFR 75, FFR 145 or FFR 235 credits using a credit card or vouchers and are valid for two months for outgoing calls and 12 months for incoming calls. Spot recharge cards are available in FFR 75 and FFR 145 denominations and are valid for three months for outgoing calls and 12 months for incoming calls.

Handset	Price (FFR)
Siemens A36	199
Alcatel OT View db	299
Siemens C25	299
Bosch 909 ds	299
Siemens A36	499
Philips Genie 2000	499
Motorola V2288	499
Alcatel OT 304	499
Nokia 3210	699
Panasonic GD52	899

France Telecom Itineris

The Itineris prepaid product, Mobicarte, has prepaid handset kits between FFR 290 and FFR 1,290, with an inclusive calling credit of FFR 144. The SIM card only deal costs FFR 270 with a FFR 144 calling credit. Mobicarte cards can be recharged with FFR 70, FFR 140, FFR 160 or FFR 250 credits using a credit card or vouchers. They are valid for two months for outgoing calls and eight months for incoming calls or for one month for outgoing calls and seven months for incoming calls when a one hour (FFR 160) scratchcard is used. There has been a downward trend in price in some of the older handsets, most notably the Nokia 3210.

Handset	Price (FFR)
Bosch 909 ds	290
Trium mct Arnette	490
	(690 in Aug 2000)
Trium Laser	490
Sagem MC 936	490
Alcatel OT 302	490
Sagem MW 936 E	490
Sagem MC 936 CB	490
Trium Mars	490
Nokia 3210	590
	(890 in Aug 2000)
Philips Az@lis	790
Ericsson T18s	790
	(990 in Aug 2000)
Philips Xenium@	1290

SFR Entrée Libre

The SFR prepaid product, Entrée Libre, has prepaid handset kits between FFR 499 and FFR 999, with an inclusive calling credit of FFR 144. The SIM card only deal costs FFR 270 with a FFR 144 calling credit. Entrée Libre cards can be recharged with FFR 96 to FFR 398 credits using a credit card or vouchers. The cards are valid for outgoing and incoming calls for: one month with a 40-minute recharge, two months with a 40- or 60-minute recharge, three months with a 240-minute recharge.

SFR has also been cutting the cost of its kits, with the Panasonic GD90 the most discounted of its handsets down over 33% since September 2000.

Handset	Price (FFR)
Motorola V2288	499
Nokia 3210	499
Alcatel OT Club db	499
	(699 in Sep 2000)
Sony CMD-CD5	599
Sagem MC 932	499
	(899 in Sep 2000)
Ericsson T10s	499
Trium Mars	599
Siemens C35	799
	(999 in Sep 2000)
Panasonic GD90	999
	(1499 in Sep 2000)

Sagem sets growth target

Sagem is aiming to sell 20 million handsets (5 million WAP, 15 million GPRS) over its next financial year. Most of the sales are expected to be in the second half of the year. The target is roughly equivalent to a growth rate of double that experienced in the world market, but this is a rate that Sagem has been experiencing for the past few years. To help meet the aim, Sagem is likely to appoint more distributors. Up to now, most of its sales have been through network operators.

Schlumberger and CT Motion to develop location-based services

Schlumberger Test & Transactions, a business segment of Schlumberger and CT Motion, a developer of location-based services management platforms and applications, has announced its plans to cooperate in the development and sale of solutions for Location-Based Services (LBS). The companies intend to actively collaborate in the marketing and sales of location-based services. These services will be based on CT Motion's Cellebrity LBS management platform and will take full advantage of the position and expertise of Schlumberger in the mobile communication business. Both companies believe this collaboration will better address the LBS needs of mobile operators, Mobile Virtual Network Operators (MVNOs), portals and Wireless Service Providers (WSPs). 'We are looking forward to working closely with a world leader such as Schlumberger,' said Guy Talmi, vice-president marketing for CT Motion. 'Their extensive relationships with network operators and our combined leading-edge technologies will make for a great value proposition in the mobile internet marketplace' he added. 'CT Motion's Cellebrity is emerging as the winning platform in the LBS field. Their innovative technology and our organisation's wide experience in mobile communication solutions should ensure our joint success in the market. Our solution should allow mobile operators, WSPs and content providers to offer innovative location-based services to their markets, both mass and vertical,' said Eric Claudel, vice-president Schlumberger Mobile Communications EMEA.

About CT Motion

CT Motion Limited develops platforms for location-based m-commerce and information services. CT Motion has a number of commercial installations around the world. CT Motion's core product is Cellebrity. It enables network operators, virtual network operators and service providers to quickly and efficiently provide and manage multiple location-based services. These services can be developed by CT Motion or by third parties. Cellebrity is compatible with a variety of mobile network, handset and positioning technologies.

Germany

Date	Subscriber
Q3 1999	19,595,000
Q4 1999	23,550,000
Q1 2000	27,722,000
Q2 2000	34,048,000
Q3 2000	40,650,000
Q4 2000	48,304,390

Regulator backs cost sharing for UMTS roll-out

The German telecoms regulator RegTP has spoken to UMTS licence holders about the extent to which they can cooperate in rolling out their infrastructure. Many of the six holders said they would be interested in sharing the costs of building out the networks, a move which could save the debt-laden companies billions of dollars. The level of cooperation has to be established. Operators need to know if cooperation could involve two licence holders building a joint network, or whether they would be restricted to a less advanced form of cost saving such as sharing some base stations.

Viag Interkom has confirmed it has talked to unnamed rivals about cooperation. The sharing of costs would appeal to Deutsche Telecom which has around EUR 60 billion of debts. It is thought that if operators do cooperate in building networks they could save up to EUR 2 billion each.

Deutsche Telekom eyes UMTS revenue in 2004

The Deutsche Telekom chief Ron Sommer has said he expects the first revenues from its 3G network in 2004. Mr Sommer said that in 2004 10% of the company's expected 25 million mobile telephone customers in Germany will use services through a UMTS network. By 2010, the operator has said it sees ARPU, at about EUR 59 per month, with 100% of Germany operating on a 3G network. Mr Sommer reiterated that about 60% of ARPU in Germany will come from data transmissions, with the rest generated by voice. He added that in 2001 to 2003, the company will focus on investments in its networks. In the past two years, Telekom has invested DEM 100 billion in its expansion, and it plans a further DEM 4 billion investment in network infrastructure during the next five years.

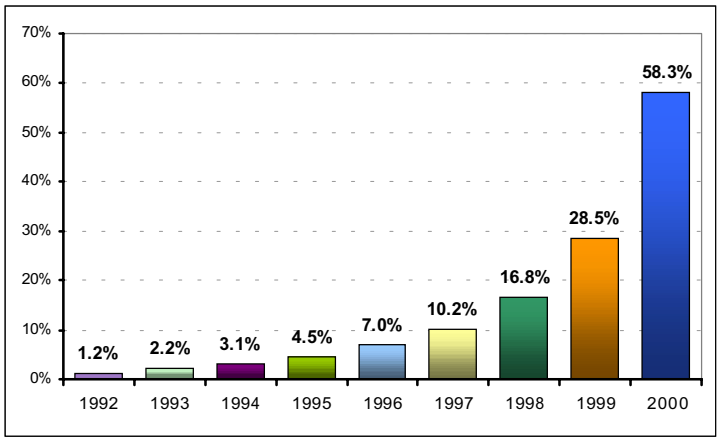
D2 Vodafone launches GPRS

D2 Vodafone has launched GPRS services for postpaid subscribers on the D2-Classic, D2-ClassicPremium, D2-Fun and D2-Data tariffs. The monthly subscription is DEM 19.95 and includes 1MB of data download. Additional data volume costs DEM 0.19 per 10KB (for incoming and outgoing data). The GSM-900 operator, which has promised data transfer speeds of 107.2kbps (dependent on handsets), said it was focusing its GPRS service on email and WAP provision. It is offering the Motorola Timeport (maximum data transfer 40.2kbps) at DEM 98 with a subscription and DEM 699 without. Activating the GPRS service costs DEM 11.50

Regulator records record growth but predicts slowing down

The German regulator RegTP has said that 2000 was a boom year for GSM usage. RegTP said the rate of growth was stronger in 2000 than in any previous year with the penetration rate hitting around 59%. The increase in subscribers in 2000 over 1999 was 105%, up from a growth rate of 68.7% between 1998 and 1999. But it says the rate of growth in 2001 is going to dip considerably as the GSM market nears penetration point. It is predicting the maximum penetration rate to be around 80%, representing 65 million subscribers.

German cellular penetration growth (1992 - 2000)



Source: EMC World Cellular Database

Operator market share at December 2000

D2-Vodafone	40.15%
T-Mobil	39.62%
E-Plus	13.66%
Viag Interkom	6.56%

Prepaid boom

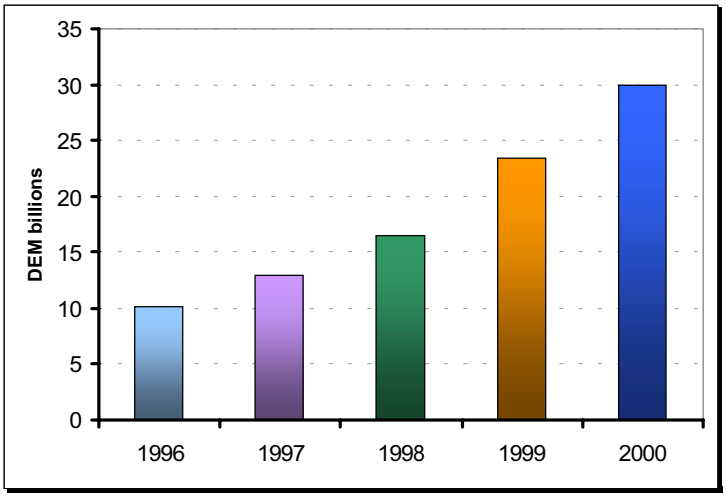
RegTP said 2000 was a crucial year for prepaid tariff options. The introduction of sub-DEM 100 packages helped to create a boom in the prepaid market with 75-80% of new subscribers choosing prepaid over postpaid. It added that by the end of 2000 almost 50% of the GSM market was prepaid. SMS was considered a success story with the opposite being true for WAP. RegTP said subscribers were disappointed with WAP because of slow data transfer rates of 9.6kbps and the initial poor availability of handsets. The authority estimates the number of subscribers with WAP handsets grew from 400,000 at the end of June 2000, to 2.5 million at the end of the year, although the number of people actually using WAP services is 'significantly lower'. The introduction of HSCSD and GPRS will make WAP services 'increasingly attractive'.

Tariffs are also playing a part in boosting GSM use. According to the statistics ministry GSM tariffs have fallen by 38% since the end of 1997, and 14% during 2000.

Turnover

The turnover of the four operators has passed the DEM 30 billion mark for the first time, representing a 25% increase over 1999. The rate of increase is considerably less than the increase in the number of subscribers signed up to GSM services with the operators faced with decreasing subscriber revenues. RegTP said this situation is due to the overall increase in prepaid subscribers.

German mobile operator turnover

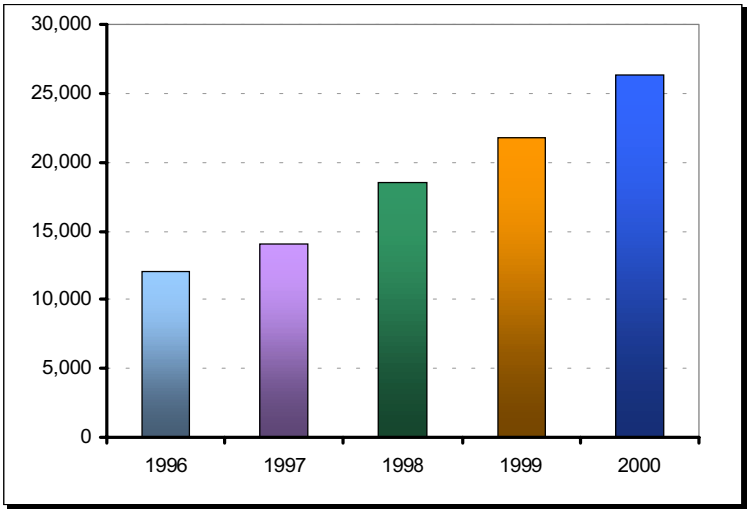


Source: RegTP, 2000 figure is an estimate

Investment in the GSM networks which concentrated on new data services hit DEM 5.8 billion, up DEM 0.8 billion from 1999. Since the end of 1997, a total of DEM 14 billion has been invested in GSM networks in Germany, much of which has been spent on improving coverage. The introduction of UMTS will also fuel a huge growth in spending in 2001 and 2002.

Employees

The four operators employed more people in 2000 than ever before with a total of 26,300 at the end of 2000. RegTP said the rate of growth in employment is slowing with operators rationalising their workforces due to increased competition.



Source: RegTP, 2000 figure is an estimate

Ford and Vodafone launch European telematics partnership

Ford of Europe and Vodafone Group announce a new strategic partnership to provide in-car telematic services in Europe. D2 Vodafone in Germany and Vodafone UK, two subsidiaries of Vodafone Group, have signed agreements to join forces with Ford of Europe to bring advanced voice-driven telematic safety, security and information services to customers across Europe. This new service will be launched in the German market from March 2001 where, through the D2 Vodafone network, it will be offered as an option on the Ford Focus. The service will be launched in the UK using Vodafone, with other European markets following.

Sema to provide E-plus with 3G billing solution

Sema, the UK-based provider of communication software and solutions, has announced that its billing product, SemaVision BSCS, has been selected by E-plus, to develop and launch its planned UMTS services. As well as a migration from a previous release of BSCS, E-plus will receive consultancy and project management services from Sema's strategic business unit, Sema Telecoms. The solution, centred around SemaVision BSCS, will provide UMTS functionality, IN features, real-time and event-driven content rating capabilities, as well as subscriber 'self care' via the web and other channels such as WAP.

T-Mobil launches flat rate international roaming

T-Mobil is launching (1 June 2001) a flat rate roaming tariff of EUR 0.89/min for calls anywhere in Europe into T-Mobile International networks, T-Mobil, One-2-One max.mobil, RadioMobil, EraGSM as well as Westel. Calls from 'preferred roaming partners' outside the T-Mobile International networks cost EUR 0.99/min. The new tariff is available to subscribers of CompanyProfi. It follows the introduction in 1999 of T-Mobil's EuroRoam tariff which offered calls at EUR 1/min for calls into Germany.

D2 to cut handset subsidies

D2 Vodafone has said it plans to cut back subsidies for handset sales, a move that will force consumers to pay higher prices for phones if manufacturers are not willing to step in. 'We have to maintain a balance between the potential for customer growth and the price we pay to acquire new customers,' said Juergen von Kuczkowski, D2's managing director. 'The problem', Mr von Kuczkowski said, 'is that new subscribers are using the phones less and the subsidies, which average DEM 300 (EUR 153.39) a customer, are not paying off. The move is an indication that operators are no longer to sacrifice profitability to gain market share.'

Group 3G looking to manufacturers for funds to finance network

Telefonica and Sonera, who together won a German UMTS licence as Group 3G, are putting together a financial package to help them pay for their network. Lucent and Siemens are to provide EUR 2 billion each, with a third party (most likely either Nortel or Ericsson) contributing a similar amount. This would allow Telefonica and Sonera to bypass the syndicated loan market, which has been increasingly reluctant to finance the construction of new networks. The two companies looked to raise money (with separate loans totalling EUR 8.4 billion) at the end of 2000 to pay for the network licence, but the bankers told them they could not provide a loan within the tight timeframe specified.

Greece

Date	Subscriber
Q3 1999	3,337,830
Q4 1999	3,894,150
Q1 2000	4,271,490
Q2 2000	4,816,760
Q3 2000	5,402,190
Q4 2000	5,932,400

Greece considers alternative UMTS licence proposal

In the light of recent UMTS licence disappointments in Europe, Greece is currently exploring the alternatives. One suggestion has been to offer up to five licences for a fixed cost, plus a percentage of the revenues generated from the licence. This would remove the need for operators to part with a large sum of money up front, a factor which could scare away potential investors. The Greek Government could also sell additional GSM spectrum, both to incumbent operators and new players. A final decision will not be taken until after the conclusion of a public consultation, due in March 2001.

Ireland

Date	Subscriber
Q3 1999	1,238,250
Q4 1999	1,512,430
Q1 2000	1,676,000
Q2 2000	1,844,960
Q3 2000	2,061,000
Q4 2000	2,475,650

Vodafone's takeover of Eircell approved by EC

The European Commission (EC) has approved the takeover of Eircell by Vodafone despite objections from eIsland, the consortium led by Mr Denis O'Brien. eIsland, considering a EUR 2.4 billion plus takeover bid for Eircom's fixed line business, objected to a clause in the agreement which prevented Eircom from re-entering the mobile market for three years. The restriction also applied to any third parties who acquired the fixed line business of Eircom and would thus apply to eIsland.

In a decision announced in Brussels in early March 2001, the Commission concluded that, although the acquisition of Eircell would add to Vodafone's European footprint, the deal did not threaten fair competition. The Commission pointed out that Eircell already faced competition in Ireland from Esat Digifone and would soon have a second competitor in Meteor. Because Eircell is not present in Britain, the deal will not affect Vodafone's share of the British market.

Market competition to increase - virtually

Following the launch of Ireland's third mobile operator, it now appears that a new virtual operator is planning to launch services by the end of 2001. But the ambitious plans of Symphony Telecom appear to depend both on cooperation from the existing operators and public demand for what it describes as 'simplified' call charges. The mobile virtual network operator concept has been strongly resisted by both Eircell and Esat Digifone. Cellular 3 is the only operator that could fall under the MVNO category in Ireland - selling airtime purchased from Eircell - and it has endured a lengthy battle to gain market entry.

Cellular 3 secured its volume discount agreement with Eircell at a time when the company was merely a reseller of Eircell calltime. Having decided to become a service provider in its own right under the Imagine brand, the company faced a legal challenge from Eircell which claimed that the original deal should be declared void on account of the changed nature of the business. Symphony claims it will undercut current call charges by as much as 25%, which would not appear to leave much room for profit. But it claims to be in negotiations with two of the current networks - which must be Eircell and Esat Digifone - and says that there has been a positive response to its proposals. The company says it will compete on price rather than services, but its prospective market entry does raise the question of just how many operators Ireland can sustain. Given that the UK has four main networks plus Virgin Mobile, it is difficult to see how a country with less than 8% of the population of the UK can sustain three networks plus at least two virtual operators.

When Meteor finally launched as the third GSM licence holder recently, there were suggestions that its best chance of making a serious impression on a market with up to 60% penetration was to focus on being first with innovative applications and trying to launch 3G services before its established rivals. If Symphony, which has around 2,500 fixed line customers in Ireland through its parent company 365 Corporation's recent acquisition of Valuetel, is serious in its assertions that it will only compete on price, there must be doubts as to how it can differentiate itself from the other operators.

Parthus develops low power GPRS technology

Parthus Technologies, providers of complete platform level intellectual property (IP) solutions targeting the mobile internet market, has taken the wraps off MobiStream, a technology that it claims greatly reduces the power requirements of GPRS handsets. According to the firm, it does this by devolving some of the power hungry features of the high speed mobile data away from the handset processor. While GPRS allows GSM/PCS data channels to be daisy chained together to achieve wireline 56kbps modem speeds on a current generation wireless network, most experts agree that power consumption is likely to be an issue with at least the first generation of GPRS handsets. This will be especially true if users elect to make use of the 'always-on' feature set of the technology.

Parthus, however, claims its MobiStream technology combines high data rates with low power consumption, and has already signed up 3Com as its first major customer for the technology. A spokesperson for Parthus told Newsbytes that, while his firm has no control over when customers like 3Com will actually ship product based on the MobiStream technology, he expects to see the first MobiStream/GPRS devices available early in 2002.

While MobiStream technology is lower power than other GPRS silicon technologies, it is just as powerful. In its first version, it will support GPRS multi-slot Class 12 transmissions, with a maximum downstream channel bandwidth of four GSM channels, and a single channel return path. This equates roughly to wireless 56kbps modem speeds downstream,

with a 12,000bps back channel. With a simple software upgrade, Parthus says that these speeds can be doubled to achieve the 115kbps mobile data speeds that GPRS will eventually offer.

Meteor aims for mobile take-off

After years of legal arguments and debates over when - and even if - the third GSM licence holder would ever launch its services in Ireland, Meteor has finally revealed some of its plans to carve a share of one of Europe's fastest growing cellular markets.

The company is promising lower prices, the elimination of peak and off-peak rates and a reduction in the discrepancies between postpaid and prepaid call charges. But even based on its optimistic early noises the company faces many obstacles, for example coverage. Meteor announced that coverage at launch is in excess of 55% of the population and includes the major urban centres of Dublin, Cork, Limerick, Waterford and Galway and the main routes between those cities. However, that leaves large chunks of the country uncovered, so it is unlikely that many business customers will switch to the (085) network until the coverage figure increases significantly. The company says it will have 65% coverage by population within six months of launch and 80% by January 2002. Because Eircell and Esat Digifone have a tight grip on the distribution network in Ireland, the company is also going to have to work hard to get its handsets onto the high streets. Meteor products will be available in 150 Xtravision video outlets and other retail partners include Dixons, Currys, Power City, RTV, Atlantic Homecare, Esso, Shell, Statoil and Texaco. It has opened six dedicated handset shops and has also appointed Carphone Warehouse as the first outside agent for its service, but again these figures pale in comparison with the chains controlled by the incumbent operators.

Most observers point to a penetration rate in excess of 60% (64.9% at December 2000, according to reported figures by EMC World Cellular Database) as proof that Meteor has relatively few non-users to target, but the company claims that Irish people are waiting to change to a network that offers clear and fair pricing and worldclass customer care. Pete Quinn, Meteor's chief operating officer, said that around 15,000 people checked out the company's pre-registration scheme and that it hoped to have 100,000 subscribers by the end of its first 12 months. Brad Horwitz, chairman of Meteor and president of major shareholder Western Wireless International, referred to GPRS as a major factor in the parent company's success to date and this is expected to be crucial to Meteor's chances of long-term success in Ireland. If the company were first to market with GPRS handsets and services, it would go a long way to compensating for the shortcomings mentioned above.

RTE eyes 3G licence

It appears that its high profile failure to secure the second mobile licence in Ireland in 1995 has not served to dissuade RTE from the merits of mobile services. The state broadcaster has been in discussion with possible partners with a view to getting involved in a bid for one of Ireland's 3G mobile licences. RTE was a 15% shareholder in the Cellstar consortium that was favoured to win the competition for the second GSM licence six years ago. However, the award finally went in favour of Esat Digifone and RTE was forced to watch as the company developed a business valued at hundreds of millions of pounds.

Unlike many of the companies expected to make a serious pitch for the new licences, RTE would not have massive funds at its disposal. What it would have, however, is the widest array of content of any Irish company and unrivalled expertise in delivering that

content to the widest possible audience. One of RTE's main objectives at the moment is the development of digital TV channels and the specialised content of these channels would be ideally suited to the mobile environment. The company also holds a large stake in the company that will operate the digital TV infrastructure, including more than 100 transmitter sites across the country. It is not clear who the favoured partner for RTE would be. The company has a lengthy relationship with the largest domestic network, having been a significant Eircell customer since the company launched its services in the mid 1980s. It is unlikely that RTE would enter a joint venture with Vivendi, the French broadcast giant that is rumoured to be among the interested parties for the UMTS competition. Other interested parties for the four licences on offer - one of which will be structured to ensure maximum opportunities for MVNOs - include the current operators as well as Meteor. Orange has also been mentioned as a likely bidder. With Vodafone in the process of completing its deal to acquire Eircell through the purchase of its parent company Eircom and BT Cellnet already established in the Irish market following its acquisition of a controlling interest in Esat Digifone, Orange would no doubt be keen to face its major UK rivals head-on in the nearest country to its home market.

More revelations over second licence award

A long running investigation into the circumstances surrounding the award of the second GSM licence to Esat Digifone in 1995 by a number of media sources has thrown up more details of the events leading up to the decision.

The paper alleged that Esat Digifone founder Denis O'Brien made or arranged a payment of $50,000 for the Fine Gael political party, which formed the government at the time of the licence award. The clear implication is that such a donation swung the balance in favour of the Esat Digifone bid or at least that it should have been returned. There was widespread surprise when the decision to award the licence to the Esat Digifone group was announced. There were other strong contenders for the licence - including a consortium headed by Motorola, which had a significant manufacturing presence in the country at the time - who were felt to have more international industry expertise and financial backing. The minister involved always denied any suggestion that the decision was influenced by external factors, pointing out that an international consultancy had done much of the work on assessing the bids and came down in favour of the group led by O'Brien. The founder of the company has also been quick to rubbish the latest allegations. In a statement he categorically denied making or arranging a payment to the Fine Gael Party in late 1995/early 1996 of $50,000 or any similar amount and said he was considering legal action. O'Brien stated (as he has done on many previous occasions) that his behaviour in regard to Esat Digifone's GSM licence was at all times entirely proper. He pointed out that the licence competition was run by independent experts from overseas and that the company had made a massive investment in preparing its bid and business plan and in securing the resources necessary for a speedy and effective roll-out.

The fact that the licence process and award have been scrutinised on a number of occasions by civil servants within the Department responsible, by successive Ministers and by the European Commission with nothing untoward found, would tend to support Denis O'Brien's views. But the ongoing media coverage and comments indicate this story has some way to run.

Italy

Date	Subscriber
Q3 1999	26,707,300
Q4 1999	30,295,320
Q1 2000	32,463,000
Q2 2000	35,150,000
Q3 2000	38,731,000
Q4 2000	42,357,000

TIM to launch W-CDMA commercial trial in March 2001

TIM is to launch a pre-commercial W-CDMA trial in March 2001 using equipment supplied by Siemens and NEC of Japan after the two companies agreed to cooperate for the project under a wider bilateral W-CDMA umbrella cooperation agreement between the two firms. The W-CDMA pre-commercial trial network will be installed in the city of Padova, an important industrial centre near Venice. Fewer than 50 base stations will be installed for the trial. Details of the network size have not been disclosed. The length of the trial has not been decided, but is expected to depend on the trial results.

Blu seeking buyer

Shareholders in Blu are to appoint Credit Suisse First Boston and Mediobanca to help find a buyer for the company. The deal could be worth up to EUR 3 billion. Blu's Italian shareholders are said to want a deal to be done by April 2001. Blu's shareholders have been increasing pressure on BT to sell its 21% stake since the company's bid for a UMTS licence in Italy embarrassingly collapsed due to shareholder disputes. It now seems that BT will sell its stake before any deal to sell the operator is finalised.

Should BT decide to sell, it will leave Blu with no telecoms-orientated companies holding stakes. Likely purchasers include new entrants to the Italian market, IPSE 2000 and Andala, both of whom recently won UMTS licences.

Vodafone agrees terms for Infostrada sale to ENEL

Vodafone Group has announced that its subsidiary Mannesmann has agreed revised terms for the sale of fixed line operator Infostrada to Enel, Italy's national electricity provider.

- The sale price is EUR 7.25 billion for the whole of the issued share capital of Infostrada. In addition, Enel will assume the net debt of Infostrada, which was EUR 1.3 billion at 26 February 2001. The net debt of Infostrada at this date comprised an intra-group debt owed to Vodafone Group companies equal to approximately EUR 1 billion
- The sale is expected to complete by 29 March 2001
- The consideration for the equity will be entirely in cash and paid on completion. The intra-group debt owed to Vodafone Group companies will be repaid in full in cash on completion
- Under the original terms of the transaction the price was subject to a market related price adjustment. Vodafone entered into a hedging transaction in order to obtain protection against an adverse adjustment. This hedging transaction has now been closed with cash proceeds to Vodafone of approximately EUR 410 million. The revised terms do not make provision for a market related price adjustment
- The agreement is subject only to the approval of the Mannesmann supervisory board
- Vodafone will apply the proceeds of the sale to reduce group debt.

Latvia

Date	Subscriber
Q3 1999	242,940
Q4 1999	278,660
Q1 2000	302,050
Q2 2000	321,830
Q3 2000	343,480
Q4 2000	398,510

UMTS licence revenue estimate

The Minister of Transportation in Latvia has announced the projected revenue for the sale of the range of licences on offer. The ministry is offering a GSM-1800 licence coupled with a UMTS licence on the open market and is offering UMTS licences to the two existing GSM operators, Baltkom and LMT.

The minister responsible stated that the decline in interest in UMTS licences in particular will lead to a lesser return than was originally forecasted. As a result of this the ministry expects to raise around LVL 20 million (rather than the LVL 50-120 million previously predicted). Despite the downward trend in revenue the minister responsible stated that the offer will go ahead no later than Q3 2001.

Macedonia

Date	Subscriber
Q3 1999	41,640
Q4 1999	62,310
Q1 2000	55,100
Q2 2000	63,360
Q3 2000	81,910
Q4 2000	98,450

Matav to decrease stake in consortium

Matav has announced its intention to reduce its holding in Stonebridge Communications AD, the company which recently acquired a 51% stake in the Macedonian communications firm Makedonski Telekomunikaci (Maktel). Matav wishes to reduce its share in Stonebridge to 51% and has offered shares to the other shareholders in Stonebridge: Cosmotelco of Greece (which holds 6.1%) and the Southeast Europe Equity Fund, (which holds 7.4%) who both have an option allowing them to increase the size of their holdings in the first year. Matav is also considering selling a portion of its stake to another outside investor and has mentioned that the European Bank for Reconstruction and Development expressed an interest in purchasing a stake. MakTel is the owner of the Macedonian cellular operator MobiMak.

Netherlands

Date	Subscriber
Q3 1999	5,723,640
Q4 1999	6,652,750
Q1 2000	7,614,120
Q2 2000	8,652,760
Q3 2000	9,723,200
Q4 2000	10,720,500

Ben calls for UMTS cooperation to cut costs

Ben has called on its four competitors to consider sharing in the roll-out of UMTS networks in an attempt to reduce costs. Ben said if companies shared antennas, UMTS services would be rolled out quicker and operators would save money. The GSM-1800 operator did not say how much money could be saved. It will announce later in 2001 which equipment provider would build its network. Deutsche Telekom, whose T-Mobile International unit owns 50% of Ben, has set a shortlist, which includes Nokia, Siemens and Nortel Networks.

KPN Telecom, The Netherlands' largest mobile operator, is winding up talks with network builders and plans to announce its choice soon. Libertel, the second-largest, expects to announce which company will build its network by the end of March 2001. Telfort is the only Dutch operator to have reached an agreement with a 3G network maker. In November 2000, it chose Ericsson to deliver and install a network for $300 million.

Libertel introduces 'split billing'

Libertel has introduced a 'split billing' facility for business subscribers who want to use their handset for private use. The facility allows business subscribers to be charged for their private calls on a separate bill. It is also possible for the employer to assign a monthly maximum, ranging from NLG 25 to NLG 150, in business calling costs to employees. Costs above this amount are charged to the employee. Split billing is available to companies with a minimum of 100 connections.

Lovers boost SMS figures

Libertel-Vodafone has said its subscribers sent 1.5 million SMSs on Valentine's Day (14 February 2001) an increase of 30% over normal SMS traffic, over 30% more than usual. On New Year's Eve 2000, Libertel-Vodafone said over 1.1 million SMSs were sent over its network with 160 messages a second at peak times.

Norway

Date	Subscriber
Q3 1999	2,596,020
Q4 1999	2,744,790
Q1 2000	2,836,040
Q2 2000	3,059,960
Q3 2000	3,137,090
Q4 2000	3,259,180

NetCom to use small market area for 3G network roll-out

NetCom will roll out the first stage of the UMTS network in December 2001. This will not be in the capital Oslo but in the near adjacent, but minor, towns of Fredrikstad and Sarpsborg, both of which are in the areas of minimum required coverage by the licence. These two towns are near enough for rapid debugging of expected running problems, are a fair microcosm of the industrial, service industry, and administration which are expected to be typical UMTS users, and will not create more demand than can be satisfied.

Terminal shortage could delay UMTS progress

The UMTS licence demands that operators are ready to roll on 1 December 2001. Nokia and Siemens have now stated that commercial quantities of UMTS terminals will not be available for the Norwegian market before mid-2002. These are the two most important suppliers. Distribution is expected to back off from a serious sales effort before these two manufacturers are on the market. Ericsson and Motorola could possibly fill the shortfall gap, but are expected to give the small volume, near saturated Norwegian market a low priority. Deliveries which are routed to the larger volume lower saturated European markets will give a bigger return upon investment. A 2-3% market share increase in Germany is probably bigger than the entire Norwegian UMTS terminal market.

This is both good news and bad news for UMTS operators. The good news is that the incumbents, who can live off incomes from the existing GSM networks will have extra time to debug uncrowded networks. The bad news is for new entry operators, who do not have GSM networks to live off, but must make the heavy investments required for network roll-out.

Telenor aquires SAIT Communications

Telenor is to acquire SAIT Communications from SAIT-STENTO for EUR 22.94 million. The acquisition strengthens Telenor's position as a major player in the global satellite mobile communication industry. SAIT Communications was a part of the SAIT-STENTO Group and provides airtime services based on a multi-supplier concept for satellite mobile

communication users. The combined businesses will establish a strategic platform for development of value added services, especially for the benefit of maritime customers.

Explosive growth in SMS

An estimated 1.25 billion SMSs were sent in Norway in 2000; this should be seen in relation to total population of only 4.3 million, and 3 million GSM subscribers. Telenor Mobil logged 849 million text messages, up 123% on 1999. NetCom had 311 million SMSs, a near doubling of the 1999 total. Sense SP had 9 million. The average price per SMS is estimated at NOK 1, the add-on revenues were therefore NOK 1.25 billion. SMS is expected to increase by at least 50% in 2001, and can possibly double yet again.

SMS was originally intended to be mainly a business user application, but was in fact seized by the teenage and younger user market segment which is now probably responsible for most SMS traffic. SMS has increased 700% in Italy during seven months, Telenor Norway has increased 1,000% during 18 months, other markets have equally rapid growth. Finnish teenagers, according to network operators, send an average 100 SMSs a month, other markets are probably at the same or higher levels. The really good news for operators is not only that teenager use is high and growing, but also that most of this is on prepaid cards which often have higher per minute charges than contract subscriptions. Nokia Networks expect that the present estimated 12 billion SMSs throughout the world in October 2000 will have increased to 100 billion by the end of 2002.

TETRA pilot network in operation

A digital TETRA pilot network replacing the existing police, fire and health emergency services analogue networks is now in operation in the Trondheim region. This pilot network will be tested up to the end of 2002; the result could be a decision to build a nationwide TETRA network price estimated at NOK 5 billion, a safe 'cash cow' income source for selected suppliers. The pilot network was financed by Telenor Mobil, Telenor Radio Systems and Nokia as the infrastructure supplier. These companies obviously hope to establish a leading edge market position as suppliers of the nationwide system if trials are favourable, Siemens as an infrastructure supplier, is expected to be a major competitor.

Service providers - an overcrowded market

Service providers (SPs) have been used in most markets from the 1980s onwards, but were a new factor on the Norwegian market until very recently. Service providers in other markets were mainly used to build up distribution networks and a market awareness to mobiles in markets which started from scratch. The Norwegian analogue cellular network, which started in 1982, inherited a distribution infrastructure and market awareness from networks dating back to the 1970s. SPs were not needed to kick-start demand. The network operators were not willing to share the subscriber market with others and jealously guarded direct links to, often directly controlled, distribution.

The 1999 Telecommunications Law enforced the use of SPs. Network operators could have circumvented this by offering discouragingly low margins, but had found out that SPs could be commercially useful. This was for subscriber gain, coverage of special niche markets, and especially the resource-consuming low ARPU prepaid market. There were only two SPs on the market in early 2000, there were 17 SPs by March 2001. All but two of these are home-grown companies; the major European SPs obviously baulked at a minor but high risk market with a low return upon investment.

Telenor Mobil has 10 of the 17 SPs, this includes Sense, the largest subscriber base SP, two Telenor owned companies, Zalto and Nextra, and Tele2 which has now gained a UMTS licence, and will probably switch loyalty to its own network in the near future.

Operator	Service provider	Start date
Telenor	Sense	Nov 1999
	Tele2	Jun 2000
	Smart Club Telecom	Jul 2000
	Zalto	Nov 1999
	Mobyson	Oct 2000
	KanKan	Jan 2001
	Carrot	Oct 2000
	Chess	Feb 2000
	Nextra	Jan 2001
	Safetel	Jan 2001
NetCom	Site	May 2000
	Tele 1 Europe	Oct 2000
	GTS	Jul 2000
	You Communications	Oct 2000
	Enitel	Oct 2000
	ElTele Ost	Nov 2000

Source: Telecom Mobil

Sense

A successor to the earlier Sense MVNO, which bankrupted in 1999. Operates as a de-facto MVNO on the Telenor Mobil network. Sense is the largest SP, with 108,000 subscribers by the end of 2000 and a higher subscriber gain than NetCom in 2000, mainly due to the various takeover battle problems which paralysed NetCom during the year.

Indicators	Telenor	NetCom	Sense
Subscribers Dec 2000	2,301,000	850,000	108,000
Prepaid	1,013,000	433,000	18,516
% prepaid	44	51	17
Gain 2000	229,000	105,000	108,000
ARPU 2000 (NOK)	323	308	264

Source: Telecom Mobil

Sense has been guaranteed wide distribution through outlets owned by the shareholder El-Kjøp electrical goods retail chain which has an estimated 10-15% of subscriber sales. Sense began by concentrating on the postpaid market, and has only recently moved into the prepaid market.

You Communications

You had 37,500 subscribers after only four months of operations, with a claimed ARPU of NOK 330 in January 2001. This is despite the fact that You aims almost exclusively at the private consumer and not the business user market. Distribution is through the Click photo chain and Thorn.

Site

Sells only postpaid, mainly through the internet, which accounts for 90% of subscriber gain. This is interesting for new start UMTS operators who may have difficulties in building up a conventional distribution base.

ElTele Øst

ElTele is one of the many regional power utility companies with a modern fibre optic communications network which can be used to re-route line traffic from the Telenor network and has been used by NetCom for this purpose. ElTele sells mobile subscriptions integrated with telecom and data services to ElTele customers, including large companies.

KanKan

Falls into the same category as ElTele Øst as being a section within the Viken Energinett power utility company. Viken has a dominating position as a power supplier with 300,000 users in the Greater Oslo area. The mobile services include security alarms and have been heavily advertised since the start in January 2001.

Zalto and Nextra

These are Telenor-owned SPs. Zalto aims at the 15-20 prepaid youth segment, Nextra is Telenor's business user internet division, and mainly targets the 20,000 Nextra corporate subscribers.

Tele2

A cuckoo in the Telenor nest. Tele2 is the renamed successor to the NetCom AB cellular operator company in the Swedish Kinnevik Group. Tele2 Sweden did win a UMTS licence and has joined up with Telia, who did not win a licence, in a common 3G network in Sweden. Tele2 did win a UMTS licence in Norway, so did the Telia-owned NetCom, and these two companies are also expected to join forces in Norway. This leaves Telenor in the rather peculiar position of having a potential major rival as an SP, NetCom with a potential partner as an SP for a rival network, and the Ministry of Communications in despair over the necessity of finding a fourth UMTS licence holder. Tele2 has obviously gained invaluable market experience and a market base as a Telenor Mobil SP, with 20,000 subscribers by the end Q3 2000. Potential UMTS subscribers within this subscriber base can be expected to be enticed over to the rival network when this is rolled out.

Enitel

A (smaller) cuckoo in the NetCom nest. Enitel is a partner in the Broadband Mobile consortium which won a UMTS licence, but is rumoured to have financing problems.

Enitel started in October 2000 and aims at the postpaid business user market.

Mobyson and Jippii

These target the 20-40 user market. Mobyson has developed various games for WAP users. The Jippii market profile is not clear as this SP only started operations in December 2000.

SmartClub Telecom

SmartClub is a membership card mega-store warehouse retailer. Card holders are offered a rather expensive subscription with a NOK 50 monthly fee and a non-refundable NOK 100 monthly fee in airtime.

Safetel

Aims at a niche market by offering domestic and business user security alarms connected by GSM to Falken, Norway's largest security company. This overlaps the KanKan product package offered by the higher resource Viken Energinett. Annual subscription prices range from NOK 700 to NOK 1,200.

GTS

GTS had 4,500 business subscribers by the end of January 2001. These had a claimed ARPU of NOK 500, which places GTS well above other providers.

All 17 SPs operate on a high penetration market where new subscriber gain has dropped off sharply, and the objectives are to either capture subscribers and airtime traffic from the two incumbent subscriber bases, or develop new product packages for the fickle youth market. The two incumbents still have an estimated 92-93% of the postpaid subscriber base with the highest ARPU; SPs are often limited to prepaid with a lower ARPU. Some SPs are backed up by larger companies who can off-load running costs against a total product range. Others are stand-alone companies entirely dependent upon the cellular market. Sense has had success, You shows promise, it is not certain how many of the other SPs will thrive and survive.

Poland

Date	Subscriber
Q3 1999	3,730,000
Q4 1999	4,030,000
Q1 2000	4,687,600
Q2 2000	5,270,000
Q3 2000	6,070,920
Q4 2000	6,760,000

France Telecom rules out equity increase in TPSA

France Telecom has stated that it will postpone acquiring a majority stake in the Polish telecoms concern Telekomunikacja Polska SA. This statement has been seen as an attempt to secure more favourable terms from the Polish Government. France Telecom and the local Kulcyzk holding were granted an option to buy an additional stake in the TPSAs held by the state plus 6% in any future IPO. The option for the 10% stake which expires in July 2001 is still valued at a price which predates the subsequent drop in telecoms shares. The shares in the agreement are valued at PLZ 38 per share, significantly above the PLZ 23 the company trades at in February 2001.

PTK Centertel share changes

The shares held by France Telecom in Polish operator Centertel will be transferred to France Telecom's Orange mobile subsidiary at the end of 2001. France Telecom did not specify whether the Polish cellular operator will be rebranded as Orange Poland. (A decision to subsume the identity of the Romanian operator MobilRom into Orange's global identity was recently announced.) This decision is subject to the approval of the polish regulator. France Telecom holds 34% of Centertel with the remainder held by fixed line operator TPSA. France Telecom recently acquired 35% of TPSA in conjunction with the local Kulcyzk group and the consortium has an option to purchase a further 16% of the TPSA operator which would give it a majority holding.

TDC acquires internet companies

Tele Danmark Corporation internet (TDC internet) has acquired 51% of six internet companies in Poland from Softbank, a Polish Software and IT integration company. The purchase price was EUR 23 million. The companies provide internet access, hosting and portal services to the entire Polish market. Business customers within the private and public sector dominate the customer base.

The Polish acquisition is an important step for TDC internet towards becoming a key player in Central and Eastern Europe. The Polish internet market holds significant growth potential and by entering the Polish internet market now TDC internet secures a strong position prior to deregulation of the Polish communications market planned for 1 January 2003.

Slovak Republic

Date	Subscriber
Q3 1999	575,780
Q4 1999	636,220
Q1 2000	742,430
Q2 2000	834,280
Q3 2000	932,890
Q4 2000	1,062,040

Globtel equity sale planned

The Slovak Government is preparing to sell its 36% stake (held by a network of state-owned utilities) in telecoms concern Globtel to a consortium headed by the insurance group AIG. The sale comes in the wake of the IPO cancelled due to the downturn in the telecoms market. The deal is being handled by Credit Suisse First Boston which has approached AIG's Eastern Europe Infrastructure Fund. France Telecom is currently the majority shareholder which has a 64% stake. Officials confirmed the existence of sales talks although an estimate of the eventual price tag has not been given.

Slovenia

Date	Subscriber
Q3 1999	503,310
Q4 1999	660,790
Q1 2000	797,890
Q2 2000	926,530
Q3 2000	1,010,780
Q4 2000	1,134,990

Mobilkom to buy controlling stake in Si.Mobil

Telekom Austria has said its mobile subsidiary Mobilkom Austria has signed an agreement to buy a controlling stake in Slovenia's second-largest mobile communications provider SI.MOBIL. Under the terms of the transaction, Mobilkom is to acquire a 49% stake in SI.MOBIL. An additional 26% plus one share in SI.MOBIL will also be acquired by Teleimpuls, a Slovenian company which is 49% owned by Mobilkom. Telekom Austria said the acquisition value was EUR 141 million. The remaining 25% less one share in SI.MOBIL will be held by other Slovenian shareholders and will be acquired by Mobilkom Austria at a later stage, it added.

Telia sells out of Si.Mobil

Telia's partly owned subsidiary, Telia Overseas, is to sell its 29% stake in Si.Mobil to Mobilkom Austria. Telia will record a capital gain of approximately SEK 450 million on the divestment. The sale of Si.Mobil is part of Telia's strategy to focus on mobile networks in the Nordic region, mobile portals in selected countries in Europe, international carrier business in Europe and the United States, and broadband services in Sweden.

Spain

Date	Subscriber
Q3 1999	12,185,830
Q4 1999	15,005,350
Q1 2000	17,505,000
Q2 2000	19,925,000
Q3 2000	22,645,000
Q4 2000	24,379,000

Telefonica rises to the top

Telefonica has become the largest former state telecommunications company in Europe, according to market valuations. However, this rise has only been brought about due to the falling share prices of its debt-ridden rivals. In February 2000, DT was worth three times as much as the Spanish company, FT was worth double and BT was also worth more. They have all now been overtaken by Telefonica. Merrill Lynch and JP Morgan are continuing to recommend shares in Telefonica to their clients, but warn that Telefonica Moviles may experience a loss in 2003, largely due to the costs of establishing UMTS services.

BT pushes for Airtel IPO

ABN Amro Rothschild, Goldman Sachs and BSCH have been called in to act as underwriters to list shares in Airtel. BT, currently saddled with a large debt problem, is understood to be able to force an IPO under the Airtel shareholding agreement. The British company is searching for ways in which it can reduce its debt and selling its stake would realise its value.

At present it is estimated that BT's 17.8% holding could be worth between GBP 2-2.5 billion.

Vodafone, who has recently gained control of the company, is unlikely to want to sell its stake but the presence of Goldman Sachs suggests the company wants a hand in any IPO (the two have worked closely before). BT is in early stage discussions with its partners in Airtel regarding an exit from the company. Any flotation would not happen until Q3 2001 at the earliest.

The CMT sets out proposals for the Spanish market

In a document released in January 2001, Spain's regulator, the Comision del Mercado de las Telecomunicaiones (CMT), outlined the methods by which competition in the sector of wireless communications could be increased. The report included a detailed analysis of the current market situation and three proposals regarding the future.

Factors the CMT took into consideration were:

- Number of subscribers
- Traffic
- Current and past trends
- The services offered
- The disequilibrium between fixed and wireless operators
- The number of operators
- Technological innovation
- Prices
- Cost effectiveness
- The delivery and range of choice
- The level of operator integration in to the market.

Whilst formulating this report, the CMT consulted all the relevant operators and shareholders to get their feedback on the conditions of the market. The regulator stressed that it is not seeking to present a concrete series of proposals, but that it has formulated a neutral pronouncement regarding the advantages and disadvantages of the models it has examined. It has sought to establish which factors which would benefit the market most. It is also to be noted that the recommendations given are not final.

The key drivers behind this report

At the beginning of the report, the CMT outlined the following principles regarding regulatory intervention:

- That intervention should be kept to a minimum
- Objectives should be clearly identified
- Effective and permanent competition should be guaranteed
- All those who are to follow the recommendations should benefit from them.

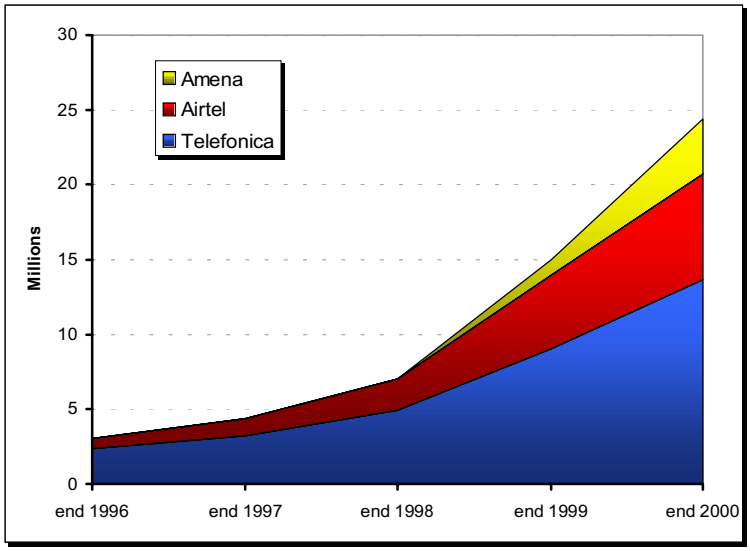
These principles will be brought to bear on what the CMT regards as the paramount problem in Spain's wireless communications market - namely the limited competition that exists. This condition has, as its consequences, high prices in relation to those witnessed in the fixed line market and also brings with it the risks associated with an oligarchy.

Sitting in tandem with this chief concern is the Spanish Government's vision of an Information Age. The CMT is acutely aware that the arrival of GPRS and UMTS will herald a new market which will push Spain towards this vision. However, the CMT also identifies the financial resources available and the limited radio spectrum as being two barriers to the realisation of the Government's aim. The progression of the wireless internet is key to this subject. Despite two years having elapsed since Spain's fixed communications market was liberalised, Spain's wireline penetration and level of telecommunications spending remain below the European average. Spain has a penetration level of just 9% with regard to private ownership of PCs.

In contrast, the wireless telecommunications market is well developed. It is through this medium that the push towards the Information Age will be made.

The current state of the market

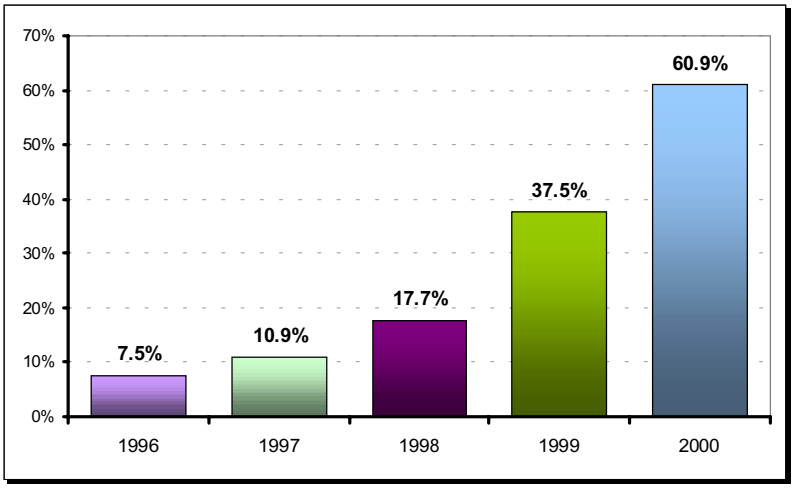
Spain's wireless telecommunications market has so far developed with little intervention from the CMT. The rate of advancement has surpassed all expectations. Now, with the market entering a state of maturity with regard to voice services, the scene is about to be altered due to the advent of GPRS and UMTS.



Source: EMC World Cellular Database

The number of subscribers in Spain has increased significantly since 1990 when Telefonica launched a TACS service. However, until July 1995, the number of subscribers failed to break the one million mark. It was only when Telefonica brought GSM-900/1800 services to market at that time, and Airtel followed in October the same year, that a real increase was seen. Even then, growth did not really take off until Amena (GSM-1800) entered the market in January 1999.

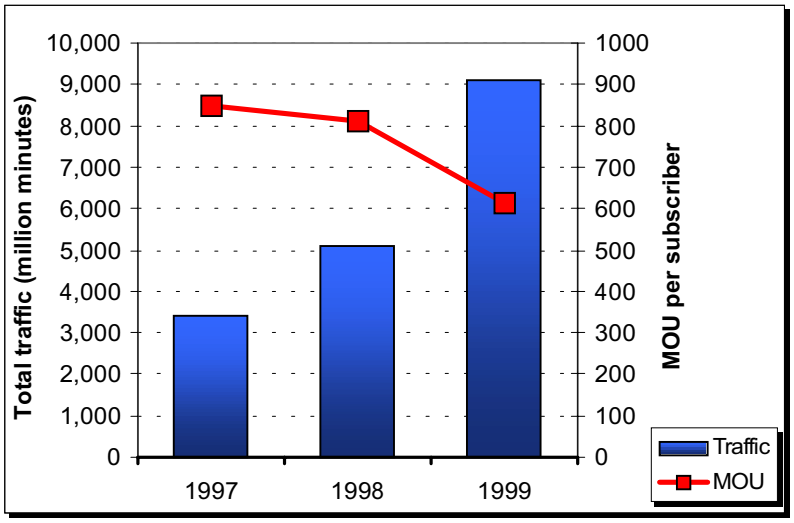
Accompanying the subscriber growth is penetration, which has increased six-fold in four years.



Source: EMC World Cellular Database

Traffic

Total traffic has also increased significantly over the last few years. In 1997 the market total stood at just under 3,500 million minutes. This rose to a little more than 5,000 million in 1998 and to over 9,000 million in 1999. This rise has come about in spite of a fall in the average minutes of use per subscriber in Spain (1997: 848, 1998: 810, 1999: 614). The dramatic change in traffic and minutes of use seen between 1998-9 is a result of the high level of subscriber growth in that period.



Source: EMC World Cellular Database and CMT Report

The increase in traffic is further illustrated by the following table, which shows that the rise of traffic between handsets has been phenomenal.

Growth of wireless traffic in Spain

	1997-1998	1998-1999
Calls between wireless handsets	90.00%	161.00%
Calls between wireless handsets and fixed lines	20.00%	29.00%

Source: CMT Report

Tariffs

In the same period the average cost of a minute's call from a wireless handset has fallen 28.3%:

Call costs in ESP	1997	1998	1999
Average cost of one minute call	93.0	81.0	66.6

Source: CMT Report

There is very little difference in the tariff prices offered by Spain's three operators. The price plans have at their core the policy of attracting and retaining subscribers. This prevents the focus being placed upon increasing traffic by reducing prices.

Furthermore, the Spanish market currently has a multitude of tariff plans which has brought about confusion on the part of the subscriber who, more often than not, does not actually know how much they are being charged for the calls they make. The CMT's main concern in the area of tariffs is the difference between calls from wireless handsets to fixed lines and calls from fixed lines to wireless handsets. Under the current set up, for which the CMT believes there is no justification, fixed line operators receive approximately ESP 6 for terminating calls to wireless handsets whilst wireless operators bring in ESP 38.5 for ending calls to fixed lines.

Expenditure

Operator costs in Spain have been considerable and have aided the rapid development of the market. They fall into three main areas:

- The building and upkeep of the network
- Marketing of services
- Subsidising terminals.

In order to be efficient, an operator needs to use its spectrum to the maximum capacity. This will grant the operator the best economies of scale. With regard to the Spanish market, CMT pointed out that it comprises one of the largest - and best covered - countries in the European Union, with an average population density of just 78 people per square kilometre. (More than 80% of its territory has a population density of less than 50 people per square kilometre.) 75% of the population is concentrated in just 25% of the territory. On average, the cost of rolling out a network in Spain is approximately 50% more than in other European countries. Put together, these factors inhibit the level of investment from operators and do not encourage other companies to enter the sector.

With regard to the marketing of services, this is continuous and dynamic. Even though some current services are nearing maturity and experience widespread use, the development and advent of others (such as WAP and GPRS) mean that expenses in this area will continue to be high. As far as subsidising terminals is concerned, this has been

a strategy followed by all three operators. The average reduction in the price of terminals has been 45%, though this varies according to the operator and model.

WAP

Like other European countries, WAP has not taken off in Spain, where there are less than two million active WAP terminals. The main reasons behind this are slow connection speed (limited to 9.6kbps) and cost. Whilst WAP has not been the success people thought it would be, this does not mean that the wireless internet has no future. With good data transmission speeds, good content and reasonable rates, the mobile internet can still take off. WAP's hand will be strengthened by the arrival to market of GPRS and UMTS.

Barriers to market entry

1. Spectrum is limited. As it is principally divided into licences, the number of licences has a direct bearing on how much spectrum is available and how many operators can be present in the market
2. The Spanish market has a low level of attraction for investors when compared to other markets
3. Incumbent operators Telefonica Moviles and Airtel have strong positions which new entrants would find hard to break.

The future of the market

The arrival of GPRS and UMTS will have a significant impact on the market. GPRS will give rise to the widespread adoption of packet data and is tipped by the CMT to rapidly push the spread of the mobile internet in a short space of time. With UMTS, time to market will be longer, but the technology will be able to build upon the foundations which will be laid by GPRS. These technologies will push the market towards the Learning Age and make up for the low adoption rate of WAP.

Recommendations of the CMT

The CMT believes that the ideal market will have (i) no limits on entering the market and (ii) a large number of operators. The regulator examined subscriber growth over time (see above) and came to the conclusion that dramatic growth only occurred after the entrance to the market of the third operator, Amena. This provides one of the bases for its argument that the number of operators in Spain should rise. The CMT is eager to stress that the current situation will be altered only by the arrival of additional operators.

The regulator also strongly believes that GPRS and UMTS technologies should be brought to market as quickly as possible. Xfera, who will enter the market as a fourth operator in H2 2001, has been granted a UMTS licence and this will boost competition not just in terms of market share and prices, but also in the services provided. The CMT has expressed fears that the current operators will not promote the new technologies as much as they could do, but the arrival of Xfera will mean that all operators will have to promote the new technologies.

Vertical integration

The CMT has also shown that vertical integration has been the key characteristic of Spain's wireless telecoms market. Whilst this has had undoubted benefits during the development of the market, the CMT argues that in a mature market it has the following effects:

- It limits the effect competition has on tariffs
- It limits the number of operators
- It establishes a high cost of entrance to the market
- The rapid development in the telecoms industry favours wireless operators over fixed operators.

Throughout Europe the model of vertical integration has been slightly modified over time. Factors which evidence this are the introduction of auctions and the arrival of MVNOs. The advent of the 'mobile internet' will cause, in many eyes, the disintegration of the vertical integration model in favour of the 'new value chain', which comprises a horizontal integration model with emphasis on content and services.

This is because, when a market reaches maturity, the operators no longer push for market share. Instead, they concentrate on product development, increasing use of their services and maximising the use of their network (which leads to increasing ARPU).

In the light of these considerations, the CMT has outlined three different scenarios regarding the future of the market.

- The maintenance of the current situation

This involves the recognition of the market's maturity in terms of voice services and the beginnings of a new market based on packet-data (with its associated new applications and services). The current falling levels of ARPU will prompt the operators to adopt and market GPRS and UMTS services in order to halt this decline. However, the CMT argues that this will not overshadow GSM services as migration to the new technologies (especially UMTS) will not be rapid. The regulator reasons that the incumbent operators will wish to delay the launching of UMTS services in order to milk all the revenue they can from GSM and GPRS services. They will, however, be thwarted in this aim by the government laying down a date of 1 August 2001 for the readiness of the 3G network and also by Xfera, which does not have a GSM licence (and so will immediately bring to market UMTS services).

Furthermore, with little being done to alter the market appearance, the only way in which prices will come down is by the development of data services. Again, the incumbent operators can be expected to milk prices, and will be hampered in this aim by Xfera who will need to offer competitively low prices in order to gain subscribers. Whilst Xfera will be an important factor in the continuance and development of competition, the CMT believes that its influence in this area will fade after one or two years. Thus, whilst competition will be stimulated for a period, the market will not develop to its full potential.

- Increasing competition by offering additional licences

This is the option that has been chosen by the Spanish Government, which is to offer one or two new GSM licences via a 'beauty contest'. These are to be in bands 1710-1740.9MHZ and 1805-1835.9MHz and will come with few obligations as far as coverage is concerned. National roaming agreements will help the new operators to offer nationwide services.

This will allow effective competition in a short space of time but, as the new operators will only offer GSM services, its use for the development of the industry is limited with respect for technology. The CMT has stated that the greatest advantages are to be gleaned by redistributing the UMTS band between six operators. However, this solution would prove to be the most costly, yield significant legal difficulties and be the most difficult to implement. Under the current set up, there are only 15MHz of 3G spectrum free, which means that a review of the spectrum awarded would be needed if more UMTS licences were to be granted.

An additional factor that needs to be taken into consideration with this proposal is that new operators will seek to gain the maximum returns possible on their investment. This is not an incentive to lower prices.

- The disruption of the model of vertical integration by MVNOs

The CMT argues that the introduction of MVNOs to the market will end the problem of limited spectrum and will guarantee competition between fixed-wireless convergent services. The regulator also sees the following benefits:

1. New technology brought to market more quickly
2. Lower tariff prices
3. Entry of new agents into the value chain
4. More efficient use of spectrum
5. Grants fixed operators access to the wireless market, thus granting them equilibrium with wireless operators
6. Less spending on infrastructure
7. Favours those operators whose infrastructure is more recent.

Only the three current operators own enough spectrum to be expected to rent any out and deals could be arranged with either of the two new GSM operators, with Xfera (who could then offer services over a GSM network) or with any other interested party. However, there are concerns with this model regarding the effects on the development of 3G networks and the new GSM networks. It is also possible that the CMT will need to set down rules by which network operators are obliged to lease a portion of their spectrum.

Conclusion

The Spanish telecommunications market enjoys high levels of coverage and penetration. Its level of technological advancement is high and is primarily supported by competition and the drive to capture market share. Competition and subscriber growth increased significantly when Amena entered the market in January 1999. However, this has barely changed the fact that the market is dominated by an oligarchy which acts in its own interests. For prices to fall further, additional operators will have to be introduced to the market. The future will see the adoption of GPRS and UMTS technologies which, with new services on offer, will serve to further stimulate competition.

Whether the government chooses to award additional UMTS licences or to promote the MVNO model, remains to be seen.

Sweden

Date	Subscriber
Q3 1999	4,942,500
Q4 1999	5,125,000
Q1 2000	5,353,000
Q2 2000	5,765,130
Q3 2000	6,085,400
Q4 2000	6,545,040

Twelve applicants for GSM spectrum

Twelve companies have applied to the PTS for GSM 900MHz and 1800MHz spectrum.

Company	Spectrum applied for	To be used for
Banverket (State railways)	not specified	Railway communication network
Airnet Broadcasting	2 x 11.6MHz (GSM-900)	Regional networks
Telenordia	n/a	National coverage
Inera Telecommunications	n/a	n/a
DotCom Solutions	2 x 11.6MHz (GSM-900)	n/a
Orange Sweden	Confidential	National coverage
Cellip	Confidential	National coverage
A Brand New World	Confidential	National coverage
Skynet AB	2 x 11.6MHz (GSM-900) 2 x 8.4MHz (GSM-1800)	Regional coverage
Europolitan	Confidential	For existing network
Telia AB	Confidential	For existing network
Tele2	Confidential	For existing network

Source: PTS (regulator)

The three incumbents will use spectrum to increase and improve the present networks. Banverket will use spectrum for a niche application which could steal some airtime revenues from the three incumbents.

Airnet and Skynet will use spectrum for regional area coverage networks. These will most likely cover main cities, towns and large conurbations to gain high airtime subscribers from incumbents.

Telenordia, Orange Sweden, Cellip and A Brave New World have applied for national coverage spectrum. Orange Sweden obviously intends to back up the UMTS licence network by the parallel build-up of a GSM network as an insurance against problems with UMTS and to erode the incumbent GSM subscriber base. Telenordia is a surprise. The Telenordia BT/Telenor consortium was a narrow loser for a UMTS licence, but Telenordia was then generally regarded as being a lame duck when Telenor severed the Viag Interkom and Esat Digifone partnership links with BT afterwards. Nothing is known of Cellip and A Brave New World, the latter must offer considerable advantages in rates and VANS if it is to live up to the company title.

Spectrum applications will use 'beauty contest' rules and are expected to be awarded in early 2002. The PTS has a reputation to live up to after turning down Telia for a UMTS licence and several of the applicants could be rejected.

Europolitan and Volvo to collaborate on telematics

Navigation and safety functions that use the mobile network to communicate will become a matter of course for the majority of tomorrow's cars, according to companies involved in navigation product development. The systems can help with navigation, place an emergency call if your airbag is released, provide information about the roads or send an alarm to your mobile handset in the event of someone attempting to break into your car.

The first step in Sweden has been taken by Volvo. In collaboration with Europolitan, Volvo plans to have safety services up and running later in 2001. Volvo is planning to use

Europolitan's GSM services to make telematics services accessible to Volvo car owners via equipment integrated in the Volvo car. In a few years' time, the agreement entails a potential of around 50,000 new telematics subscriptions per year.

The collaboration agreement between Europolitan and Volvo covers telematics services for Volvo's cars. Europolitan's principal owner Vodafone recently launched a strategic partnership with Ford Motor Company, the owners of Volvo, concerning similar telematics services developed for their customers. Volvo Cars customers will initially be offered services that focus on safety. In the event of the car's airbag being released, the car will automatically place an emergency call and simultaneously notify the emergency service centre of its position. The emergency signal can also be activated by pressing a button on the car's dashboard.

Other services that can be offered via the telematics system include road side assistance, navigation, travel and traffic information, automatically recommending and booking a garage appointment when the car is due for servicing, and sending an alarm to your mobile handset if someone tries to break into your car.

Telia signs Letter of Intent for Nordic UMTS suppliers

Telia has signed a Letter of Intent with Nokia and Siemens regarding UMTS infrastructure in Norway (NetCom) and Finland with an option in Denmark. The agreements are part of Telia's Nordic UMTS infrastructure strategy. The Letter of Intent concerns future general agreements and country specific subagreements for 3G core and 3G Radio Access Solutions in Norway and Finland where Telia already has been awarded UMTS licences with an additional option for Denmark subject to licence.

NetCom, Telia's Norwegian mobile operator, is first in line with a country specific Letter of Intent in Norway and is aiming to open the UMTS network in December 2001. A fast roll-out and wide population coverage are part of the Norwegian concession terms. NetCom will, within three years, offer coverage of 76.5 % and will thereby cover most densely populated areas with over 1,000 inhabitants. The supplier purchasing in the Swedish market will be handled by the joint Telia-Tele2 networking company subject to the approval by the competitive authorities.

Europolitan to sell network capacity to Mobyson and LunarStorm

Europolitan and mobile operator Mobyson, which specifically targets young people, have signed a long-term service provisioning agreement, whereby Mobyson will buy capacity in Europolitan's GSM network and offer mobile subscriptions and services under its own brand.

Mobyson's target group is Europe's younger generation between the ages of 17 and 32 and the company's service offering has a strong emphasis on entertainment and gaming. Mobyson plans to start launching its services in Sweden during the course of 2001.

Europolitan has also signed a similar service provisioning agreement with LunarWorks, which runs LunarStorm, a website for young people that has been successful in attracting just over 650,000 members in a short time. LunarStorm plans to start marketing and selling mobile telephony services to its members under its own brand in 2001.

TELE2 AB approved as new name for NetCom

NetCom has announced it has changed its name to Tele2 with immediate effect. This change was approved at an Extraordinary General Meeting of NetCom shareholders. Tele2 (formerly NetCom), formed in 1993, is a leading alternative pan-European telecommunications company offering fixed and mobile telephony, data network and internet services under the brands Tele2, Tango, Comviq, Baltkom GSM and Q-GSM.

Tele2 also operates Datametrix, which specialises in systems integration, Optimal Telecom, 3C Communications, operating public pay telephones and public internet services, Transac, providing billing and transaction processing services. The Group also offers cable television services under the Kabelvision brand name and, together with MTG, owns the internet portal Eveyday.com. The company is listed on the Stockholm Stock Exchange, under TEL2A and TEL2B, and on the Nasdaq Stock Market, under TLTO.

Tele2 and Telia sign agreement to form UMTS network company

Tele2 and Telia have signed the final agreement concerning the creation and maintenance of a jointly owned UMTS network company . The company will be named Svenska UMTS-nät.

In accordance with the Agreement in Principle signed on 8 January 2001, the final agreement between Tele2 and Telia gives equal access to the UMTS licence awarded to Tele2. Each party obtains a 50% ownership in the joint venture. The sole objective of the joint venture is to create a UMTS network supporting full coverage of Sweden. On the service side, the competition between Tele2 and Telia remains.

The signed final agreement is subject to approval by the Swedish Competition Authority. The agreement is valid irrespective of the outcome of Telia's appeal with the county administrative court of the PTS' decision not to award Telia a UMTS licence.

Telia open to talks with Telenor

Marianne Nivert, the managing director of Telia, has said that the company is not ruling out further talks with Telenor. However, she stressed that a merger was not on the cards. Cooperation in the Baltic states (Estonia, Latvia and Lithuania) would be particularly relevant, according to Nivert, although no talks are being held on this subject.

The Baltic states, together with the countries in the Nordic area, have been designated priority markets by Telia. Despite the importance of these markets, Telia will not consider buying parts of Telenor. Telia and Telenor are prepared to talk to new 3G cooperation partners. Telenor is particularly interested in gaining a foothold in the Swedish mobile market, and Telenor's managing director Tormod Hermansen has stated Telenor was talking to all the companies that won Swedish 3G licences.

Switzerland

Date	Subscriber
Q3 1999	2,640,290
Q4 1999	3,048,500
Q1 2000	3,553,000
Q2 2000	3,995,500
Q3 2000	4,370,100
Q4 2000	4,716,800

Swisscom gets go-ahead for Vodafone deal

Swisscom shareholders have given the company the green light to sell a 25% stake in its Swiss mobile activities to Vodafone Group for CHF 4.5 billion ($2.64 billion). Vodafone will pay CHF 2.2 billion on closing and another CHF 2.3 billion, plus interest, no later than 12 months after the deal has been completed. According to the sale terms, Vodafone can elect to pay in either shares, cash, or both. The revenue will be used for investments in the group's core activities, as well as a repayment of debt.

The Vodafone deal will cap a six-month period in which Swisscom, which is still majority-owned by the Swiss Government, has taken tentative steps towards shaking off its image as being behind other European telecoms companies.

SMS used to stub out the habit

Swiss smokers who are wanting to kick the habit are using SMSs as the latest non-smoking aid. Smokers in the Canton of Berne who feel the urge to light up can send a text message and receive a reply urging them not to do so. The programme run by the cantonal authorities is aimed at young people who are less likely to read advice brochures. The service includes 60 different messages in German and costs CHF 0.12. Berne canton said it is getting 400 daily appeals for help from smokers.

Swisscom in Q3 2001 GPRS launch?

Swisscom sources have said at the 3GSM World Congress in Cannes that the Swiss GSM-9/18 operator will probably launch GPRS in the third quarter of 2001. It is expected that the operator will launch GPRS roaming for postpaid subscribers at the same time. Data transmission speeds will initially be 'somewhere in the region of 15-25kbps, probably 20kbps'. There was no guidance about tariffs.

Swisscom will use GRX (GPRS Roaming Exchange) to roam with GPRS networks in other countries. It will launch with 'six preferred European partners who have compatible technical standards'. Those partners are expected to be in Germany, France, Italy and the UK. It is thought that all domestic GPRS services will be available to roaming subscribers. It is likely that GPRS roaming services will be channelled through the home network or PMN (public mobile network) rather than via ISP roaming on the visited country's network. ISP roaming, according to the Swisscom source, has a number of 'technical problems', although the decision to favour PMN roaming is probably based on the control over revenue that the operator retains when routing services through the PMN.

Turkey

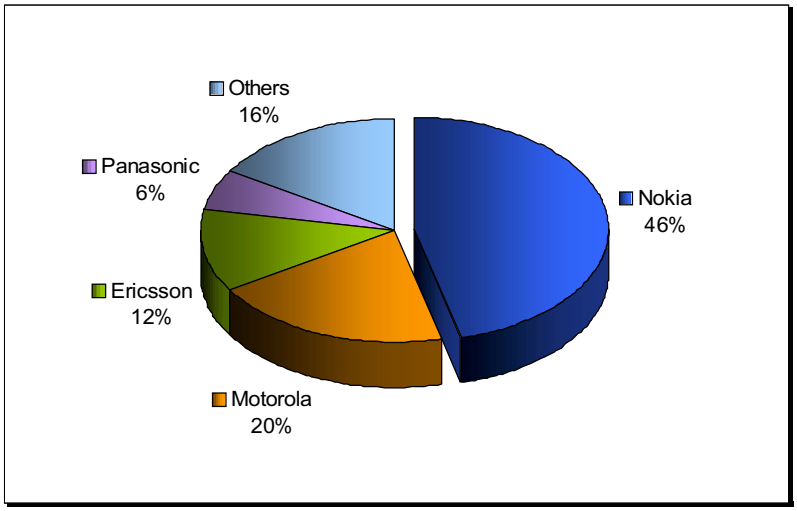
Date	Subscriber
Q3 1999	6,749,190
Q4 1999	8,075,790
Q1 2000	9,152,860
Q2 2000	10,806,950
Q3 2000	13,549,250
Q4 2000	16,190,730

Turkcell launches GPRS

Turkcell has announced the commercial launch of GPRS services. Initial testing was completed in May 2000. The network infrastructure has since been completed and GPRS is now available throughout Turkey, according to the operator. Turkcell has invested $7 million in GPRS to date. GPRS services are available to contract subscribers only. Subscribers will not be charged for airtime use, instead they will be charged for the amount of data transferred.

Nokia leads handset sales in Turkey

Nokia has accounted for 46% of all handsets sold in Turkey during the year 2000, more than double their nearest competitor, Motorola, in that market. Other leading players were Ericsson and Panasonic.



Source: ARTEL

Those covered in the 'others' bracket are Siemens, Samsung, Alcatel, NEC, Maxon, Kenwood, Sony, Sagem and Philips.

KVK (Turkey's largest vendor) estimates that a total of nine million handset sales were made during 2000. Of these, KVK accounted for three million. The company expects to sell 3.5-4 million in 2001, with the overall total growing to 14-15 million.

UK

Date	Subscriber
Q3 1999	19,546,000
Q4 1999	24,044,000
Q1 2000	27,387,000
Q2 2000	30,888,800
Q3 2000	34,795,370
Q4 2000	40,740,240

Crown Castle in lease deal with Hutchison

Crown Castle International, which owns and operates transmission masts on behalf of broadcasters and mobile phone operators, has agreed to lease space at 4,000 sites to Hutchison 3G UK for 25 years. The operator has agreed to lease the space on the 4,000 Crown Castle sites with an option over another 2,536. According to Hutchison 3G UK, sharing the masts rather than building its own infrastructure would allow it to roll out 3G services by the middle of 2002.

BT now considers demerger an option

BT has now announced it would not rule out a full flotation of its BT Wireless arm. The company stated it would not exclude a partial demerger, a full demerger or flotation, or a sale of the business. A final decision is expected shortly and will take into account the market conditions.

Over 900 million text messages sent in January 2001

The Mobile Data Association (MDA) has announced that over 900 million text messages were sent throughout the UK during January 2001. The total number of chargeable person to person text messages sent across the four UK GSM network operators was 929 million, compared to 322 million sent in the same period in 2000. February's figure was also expected to be high due to the vast number of text messages sent on Valentine's Day.

Voice recognition as a means to curb theft

A UK company is developing a voice recognition system for mobile phones that would learn what its owner sounds like and refuse to work if the phone was stolen. The technology comes from research by scientists at Portsmouth University, and has been packed into a software program called 'Neuvoice'. It is so small it could be possible to transmit the program to phones that are already in use. The use of a PIN would let users lend the phone to a friend, or to operate it when their voice changed - as happens when they had a cold.

Vodafone says its past subscriber figures 'overstated ... active market'

Vodafone Group has announced that with effect from April 2001, it will change the way it reports quarterly customer numbers to allow investors to monitor progress more closely and to 'represent more comprehensively the drivers of revenue growth' and is also introducing new commercial policies to sustain cash-flow growth.

Over the last two years, the mobile market worldwide has been experiencing a period of high growth in customer numbers. However, a distinction has emerged between the number of customers that are registered on networks and those that could be considered 'active' customers. Vodafone defines an 'inactive' customer as a customer who has not made or received a call in the last three months. In recent months, the mobile industry has experienced a number of issues that have led to an increase in the 'inactive' base, in particular, prepaid users upgrading their handsets who will ultimately dispose of their original device and the purchase of handsets for onward sale by dealers.

Customer numbers presented by Vodafone at the end of each quarter represent handsets that are legitimately registered on its networks. However, Vodafone believes that these figures overstate the 'active' customer base by approximately 9%. During January 2001, within Vodafone's controlled operations, 94% of the contract customer base and 90% of the prepaid base were 'active' users. In future, Vodafone intends to publish its registered customer numbers within four or five days of the quarter end and, in addition, will within a month of the end of each quarter announce further information on its subsidiaries' 'active' customer bases as well as updating investors on their various key performance indicators such as ARPU and data percentages. Vodafone believes that all mobile operators have a proportion of their customer bases which are 'inactive' and believes that this method of reporting customer numbers should become standard for the industry.

This new denominator will also help to determine 'real trends in ARPU', the level of which is negatively influenced by 'inactive' customers, says Vodafone. Although the rate of decline of ARPU on the registered customer base is moderating, the reduction of ARPU in the 'active' users is less.

One-2-One plans to charge more for prepay

One-2-One is planning an increase in the price of its prepaid handsets and admits it does not expect to see a return on its 3G licence investment until 2011. The company is planning

to introduce a new structure in Q2 2001 to promote monthly tariffs ahead of its dominant prepay business. The move will see prepay handsets, which have sold as cheaply as GBP 9, retail between GBP 50 and GBP 70. Around 70% of One-2-One's 8.5 million customers are currently on a prepay tariff.

One-2-One hopes that by making monthly tariffs comparatively more attractive it will be easier for the company to bill customers for future information services, one of the main reasons behind the 3G investment.

BT to launch GPRS to consumers in mid-2001

BT Cellnet has stated it will launch GPRS services for the consumer market in mid-2001, around the same time as Vodafone, which also expects to offer GPRS to consumers, after launching to the corporate market on 2 April 2001. It expects to have handsets from at least six manufacturers by then. Orange has yet to give a clear date for the launch of GPRS, saying only that it will be from Q2 2001. One-2-One is currently trialling business services.

3G mobile licence holders discuss sharing infrastructure

The five holders of 3G mobile phone licences have held informal discussions on sharing infrastructure in an attempt to cut the GBP 20 billion plus cost of rolling out new networks throughout the country. According to industry sources, all five network operators, Vodafone, BT Wireless, Orange, One-2-One and Hutchison 3G, would consider sharing 3G infrastructure such as masts and cabling. Several operators already share mobile phone masts and are planning to expand their relationships as they upgrade networks for commercial UMTS services from late 2002.

The moves are expected to be welcomed by the Government, which is keen to reduce the number of mobile phone towers throughout the UK. There are already 22,000 mobile phone masts in the UK, with at least another 18,000 needed for 3G.

Project Telecom acquires subscribers from Hutchison

Service provider Project Telecom, which offers mobile services over the Vodafone network, has acquired the UK Cellnet and Vodafone subscriber base of Hutchison Cellular Services, a wholly owned subsidiary of Orange for a cash consideration of GBP 14 million.

Project Telecom has acquired from Hutchison approximately 55,000 network subscribers taking the total subscriber base for the group to in excess of 110,000. The Hutchison business supplies telecommunications services to a wide range of major corporate accounts. The acquisition, which does not involve the transfer of any infrastructure or employees from Hutchison to Project Telecom, was completed on 9 March 2001.

The transfer of Hutchison subscribers to Project Telecom's billing platform will take place over the next four to five months with Hutchison continuing to manage part of the subscriber base during the transfer period. The transfer has been carefully planned, in consultation with Hutchison, in order to 'provide a seamless service to customers'.

Carphone Warehouse and FT to form wireless venture

The Financial Times Group (FT) and the Carphone Warehouse Group have announced a commercial joint venture to launch an exclusive virtual mobile network, offering high quality phones, premium business and financial content, and after sales service.

Launching to customers in the spring 2001, the FT Mobile phone package will be available through FT.com, Carphone Warehouse stores and carphonewarehouse.com. The virtual mobile network consists of top of the range FT-branded internet-enabled handsets and premium content from the FT. The Carphone Warehouse will provide sales and marketing support, as well as facilities management services on behalf of FT Mobile, including credit checking, billing, after sales care and revenue management. BT Cellnet is the chosen airtime operator. In return for the use of content provided by its newspaper, FT will get a share of airtime charges through BT Cellnet. The initial range of handsets will be supplied by Siemens, Nokia and Sony.

With the FT Mobile phone package, users will be able to access relevant, customised breaking news and information from FT.com, FTMarketWatch.com and a number of other content partners. By registering with FT.com, users can personalise the content they receive, allowing them to:

- Access breaking news on their chosen industry sector
- Read FT commentary, including the Lex column
- Track real-time share prices, including immediate access to the user's most important stocks
- Search FT.com's global archive of more than 10 million articles, preset to the customer's most frequently used reference enquiry
- Access email and calendar facilities through FT.com's Personal Office.

This personalised content, called FT Mobile Gold, is an inclusive part of the package, but would normally cost GBP 10 a month to other users of internet-enabled mobile phones.

RIM makes its first move into Europe with new GPRS device

Pager maker Research In Motion (RIM), which already has a massive presence in North America, has finally made its first move into Europe. The Ontario-based company has signed a supply deal with BT Cellnet that will introduce a new version of its interactive pager to run over the UK-based mobile operator's GPRS networks, which are expected to start operating mid-year. BT Cellnet has made a commitment to order 175,000 of the devices, along with the associated server-based software that can connect users to their corporate Exchange and Notes email inbox. The company has revealed no exact technical details of the new device it will introduce for the European market. The company has, however, stated it will be comparable to existing BlackBerry pagers. The newest RIM product, the BlackBerry 957, is more in the vein of a wireless Palm-style hand-held than a conventional pager and will therefore have more chance of success in the UK than a conventional pager. The UK market has not embraced pagers to the same extent as North America.

RIM has been running GPRS device tests with BT Cellnet since the middle of 2000. In North America, RIM devices have been running over pager networks such as Cingular's Mobitex network. With the roll-out of GPRS across Europe over the next couple of years, RIM will have a chance to offer its service in many new markets.

Statistics and Data Tables

Analogue celullar subscribers and networks (February 2001)

**: Estimate*

Operator	Network	System	On Air	Dec 2000	Feb 2001
Austria				**150,000**	**141,700**
Mobilkom	Mobiltelfonnetz-D	TACS	Jul 90	150,000	141,700 *
Azerbaijan				**8,500**	**7,250**
Bakcell		E-TACS	Feb 94	8,500	7,250 *
Belarus				**18,000**	**18,500**
Belcel		NMT-450	Apr 93	18,000	18,500 *
Bulgaria				**167,990**	**174,700**
Mobikom	Mobifon	NMT-450i	Dec 93	167,990	174,700 *
Croatia				**78,900**	**78,100**
HPT	Mobitel	NMT-450	Nov 91	78,900 *	78,100 *
Cyprus				**1,200**	**1,120**
CYTA		NMT-900	Dec 88	1,200	1,120
Czech Republic				**67,000**	**66,800**
EuroTel Prague	EuroTel Classic	NMT-450	Sep 91	67,000	66,800 *
Denmark				**50,320**	**40,440**
Tele Danmark Mobil		NMT-450	Jan 82	8,920 *	8,540 *
Tele Danmark Mobil		NMT-900	Dec 86	41,400 *	31,900 *
Estonia				**2,000**	**0**
Eesti Mobil Telefon	EMT-NMT	NMT-450	Jan 91	2,000	
Faroe Islands				**4,260**	**3,830**
Faroese Telecom		NMT-450	Jan 89	2,140	2,050 *
Faroese Telecom		NMT-900	Jun 92	2,120	1,780 *
Finland				**88,000**	**51,000**
Sonera		NMT-450	Mar 82	56,000	51,000 *
Sonera		NMT-900	Dec 86	32,000 *	
Georgia				**13,090**	**14,550**
Iberiatel		NMT-450	Apr 2000	290 *	350 *
Megacom	Bee Line	AMPS	Jan 95	12,800 *	14,200 *
Germany				**9,500**	**0**
T-Mobil	C-Mobil	C-450	Sep 85	9,500	
Greenland				**5,500**	**4,920**
TeleGreenland		NMT-900	Nov 92	5,500	4,920 *
Hungary				**84,200**	**82,300**
Westel		NMT-450	Oct 90	84,200 *	82,300 *
Iceland				**28,200**	**27,980**
Iceland Telecom	Síminn	NMT-450	Jul 86	28,200	27,980
Ireland				**40,000**	**24,400**
Eircell	Eircell	TACS	Dec 85	40,000	24,400 *
Italy				**2,750,000**	**2,679,700**
Telecom Italia Mobile	TIM TACS	TACS	May 90	2,750,000	2,679,700 *
Kazakhstan				**54,300**	**57,090**
BECET	Altel	N-AMPS	Sep 94	49,600 *	52,000 *
Mintek	Zharshi	AMPS	Aug 98	4,700 *	5,090 *
Kirghizstan				**8,220**	**8,690**
ICG/Katel	Bee Line	AMPS	Jul 94	8,220 *	8,690 *
Latvia				**8,590**	**8,030**
LMT	LMT-NMT	NMT-450	Jan 92	8,590	8,030 *
Lithuania				**6,110**	**5,370**
Comliet UAB	Comliet NMT	NMT-450	Feb 92	6,110 *	5,370 *

Operator	Network	System	On Air	Dec 2000	Feb 2001
Norway				**143,000**	**130,600**
Telenor Mobil		NMT-450	Nov 81	118,000	117,300 *
Telenor Mobil		NMT-900	Dec 86	25,000	13,300 *
Poland				**120,000**	**109,500**
Centertel		NMT-450i	Jun 92	120,000	109,500 *
Romania				**21,310**	**23,700**
Telemobil	SunTel	NMT-450	May 93	21,310	23,700 *
Russia				**641,000**	**679,030**
Moscow : MCC	MCC	NMT-450	Dec 91	100,500	102,900 *
St Petersburg : Delta Telecom	Delta Telecom	NMT-450	Jul 91	78,000	82,800 *
St Petersburg : St Petersburg Telecom	FORA	AMPS	Jul 94	31,200	33,400 *
Russia : Other - AMPS		AMPS		258,770	277,590
Russia : Other - NMT-450		NMT-450		172,530	182,340
Serbia				**8,000**	**7,700**
PTT Serbia		NMT-900	Nov 95	8,000	7,700 *
Slovak Republic				**16,290**	**15,800**
Eurotel Bratislava		NMT-450	Sep 91	16,290	15,800 *
Slovenia				**41,150**	**41,000**
Mobitel		NMT-450	Nov 91	41,150	41,000 *
Spain				**327,000**	**268,100**
Telefónica	MoviLine	TACS	Apr 90	327,000	268,100 *
Sweden				**181,000**	**152,700**
Telia Mobitel	Telia Mobitel	NMT-450	Oct 81	154,000	152,700 *
Telia Mobitel	Telia Mobitel	NMT-900	Dec 86	27,000	
Tadjikistan				**1,650**	**1,810**
TadjikTel	Touchfone	AMPS	Dec 96	1,650	1,810 *
Turkey				**90,730**	**86,100**
Turk Telecom		NMT-450	Oct 86	90,730	86,100 *
Turkmenistan				**9,500**	**10,300**
Barash Communications		AMPS	Nov 94	9,500	10,300 *
UK				**174,000**	**118,600**
Vodafone	Vodafone	TACS	Jan 85	174,000	118,600 *
Ukraine				**60,000**	**56,000**
Ukrainian Mobile Communications		NMT-450	Jul 93	60,000	56,000
Total - Analogue				**5,478,510**	**5,197,410**

Digital celullar subscribers and networks (February 2001)

**: Estimate*

Operator	Network	System	On Air	Dec 2000	Feb 2001
Albania				**29,410**	**32,600**
AMC	AMC Mobil	GSM-900	Jun 96	29,410	32,600 *
Andorra				**27,120**	**28,400**
STA	Mobiland	GSM-900	Mar 95	27,120	28,400 *
Armenia				**16,000**	**17,000**
Armentel		GSM-900	Jan 98	16,000 *	17,000 *
Austria				**6,000,000**	**6,357,200**
Connect Austria	One	GSM-1800	Oct 98	1,150,000	1,265,100 *
MaxMobil		GSM-9/18	Dec 96	2,100,000	2,200,000 *
Mobilkom		GSM-9/18	Dec 92	2,650,000	2,763,800 *
tele.ring		GSM-1800	May 2000	100,000	128,300 *
Azerbaijan				**472,750**	**512,400**
Azercell	Azercell	GSM-900	Dec 96	385,000	413,900 *
Bakcell		GSM-900	Dec 98	87,750	98,500 *
Belarus				**21,500**	**23,900**
MDS Velkom	Velkom	GSM-900	Apr 99	21,500	23,900 *
Belgium				**5,577,000**	**5,978,800**
Belgacom Mobile	Proximus	GSM-9/18	Jan 94	3,277,000	3,479,100 *
KPN Orange	Orange	GSM-1800	Mar 99	500,000	567,900 *
Mobistar	Mobistar	GSM-900	Aug 96	1,800,000	1,931,800 *
Bosnia Herzegovina				**206,000**	**261,400**
Eronet Mobile Communications d.o.o.		GSM-900	Apr 2000	20,000	26,500
GSM BiH (PTT BiH)		GSM-900	Oct 96	118,000	139,300 *
Republika Srpska - JODP	Mobilna Srpska	GSM-900	Aug 99	68,000	95,600 *
Bulgaria				**570,000**	**631,300**
MobilTel	M-TEL	GSM-900	Sep 95	570,000	631,300 *
Croatia				**857,100**	**941,600**
HPT	Cronet	GSM-900	Dec 95	357,100 *	381,000 *
VIP-Net		GSM-900	Jul 99	500,000	560,600 *
Cyprus				**245,530**	**254,010**
CYTA	CYTAGSM	GSM-900	Apr 95	195,530	200,810
Northern Cyprus - KKTCell	KKTCell	GSM-900	Jul 99	50,000	53,200 *
Czech Republic				**4,280,820**	**4,823,000**
Cesky Mobil	Oskar	GSM-9/18	Mar 00	301,700	364,700 *
EuroTel Prague	EuroTel GSM	GSM-9/18	Jul 96	2,104,120	2,373,300 *
RadioMobil	Paegas	GSM-9/18	Oct 95	1,875,000	2,085,000 *
Denmark				**3,428,000**	**3,584,700**
Mobilix	Mobilix	GSM-1800	Mar 98	517,000	556,100 *
Sonofon	Sonofon	GSM-900	Mar 92	966,000	989,900 *
Tele Danmark Mobil	TDK-GSM	GSM-900	Mar 92	1,648,000	1,722,600 *
Telia	Telia	GSM-1800	Jan 98	297,000	316,100 *
Estonia				**543,900**	**570,600**
Eesti Mobil Telefon	EMT-GSM	GSM-9/18	Sep 93	327,000	341,500 *
Radiolinja Estonia	GSM 256	GSM-9/18	Jan 95	130,000	137,600 *
Ritabell	Q GSM	GSM-900	Apr 97	86,900 *	91,500 *
Faroe Islands				**13,170**	**14,700**
Faroese Telecom		GSM-900	Oct 98	13,170	14,700 *
Finland				**3,735,540**	**3,829,720**
Åland - Åland Mobil		GSM-900	Dec 93	8,620	9,020 *
Finnet Group	City Telephone	GSM-1800	Apr 98	50,000	53,000 *
Radiolinja		GSM-9/18	Jan 92	1,246,000	1,260,600 *
Sonera	Sonera GSM	GSM-9/18	Jun 92	2,281,920	2,339,500 *
Telia Finland		GSM-1800	Mar 98	149,000	167,600 *

Operator	Network	System	On Air	Dec 2000	Feb 2001
France				**29,052,300**	**30,664,500**
Bouygues Telecom	Bouygues	GSM-1800	May 96	5,190,300	5,567,100 *
Cegetel	SFR	GSM-9/18	Apr 93	9,921,500	10,330,000 *
France Telecom	Itineris	GSM-9/18	Jun 92	13,940,500	14,767,400 *
Georgia				**120,200**	**125,500**
Geocell	Geocell	GSM-900	Mar 97	21,800 *	19,600 *
GT Mobile	GT Mobile	GSM-9/18	Aug 2000	2,500 *	3,500 *
Magticom	Magticom	GSM-900	Sep 97	95,900 *	102,400 *
Germany				**48,294,890**	**51,726,200**
E-Plus Mobilfunk	E-Plus	GSM-1800	May 94	6,600,000	7,192,300 *
Mannesmann Mobilfunk	Vodafone D2	GSM-900	Jul 92	19,394,340	20,994,200 *
T-Mobil	D1	GSM-900	Jul 92	19,130,550	20,000,000
Viag Interkom	E2 Citypartner	GSM-1800	Oct 98	3,170,000	3,539,700 *
Gibraltar				**5,580**	**5,900**
Gibraltar Telecom	GibTel	GSM-900	Jan 95	5,580	5,900 *
Greece				**5,932,400**	**6,280,300**
Cosmote	Cosmote	GSM-1800	Apr 98	2,061,010	2,231,400 *
Panafon	Panafon-Vodafone	GSM-900	Jul 93	2,226,000	2,323,700 *
STET Hellas	TeleSTET	GSM-900	Jul 93	1,645,390	1,725,200 *
Greenland				**9,610**	**10,400**
TeleGreenland		GSM-900	Dec 98	9,610	10,400 *
Guernsey				**23,740**	**25,100**
Guernsey Telecom	Guernsey Telecom GSM	GSM-900	Apr 96	23,740	25,100 *
Hungary				**3,000,400**	**3,734,900**
Pannon GSM	Pannon GSM	GSM-9/18	Mar 94	1,216,960	1,499,900 *
Vodafone Hungary		GSM-9/18	Dec 99	184,220	214,500 *
Westel	Eurofon	GSM-9/18	Mar 94	1,599,220	2,020,500 *
Iceland				**185,600**	**189,570**
Iceland Telecom	Síminn	GSM-9/18	Aug 94	130,600	132,570
TAL	TAL	GSM-900	May 98	55,000	57,000
Ireland				**2,435,650**	**2,628,700**
Eircell	Eircell	GSM-9/18	Jul 93	1,447,650	1,566,500 *
Esat-Digifone	Digifone	GSM-9/18	Mar 97	988,000	1,062,200 *
Isle of Man				**28,340**	**30,300**
Manx Telecom	Pronto GSM	GSM-900	Feb 96	28,340	30,300 *
Italy				**39,607,000**	**41,921,200**
Blu		GSM-1800	May 2000	800,000	1,020,000 *
Omnitel Pronto Italia	Omnitel	GSM-9/18	Dec 95	15,057,000	15,919,600 *
Telecom Italia Mobile	TIM	GSM-9/18	Oct 92	18,850,000	19,481,600 *
Wind		GSM-1800	Mar 99	4,900,000	5,500,000 *
Jersey				**44,740**	**47,630**
Jersey Telecoms	JT GSM	GSM-900	Dec 94	44,740	47,630
Kazakhstan				**214,850**	**242,800**
GSM Kazakhstan	KCell	GSM-900	Feb 99	145,000	164,000 *
Kar-Tel	K-Mobile	GSM-900	Feb 99	69,850	78,800 *
Kirghizstan				**4,990**	**5,310**
Bitel		GSM-900	Sep 98	4,990 *	5,310 *
Latvia				**389,920**	**411,800**
Baltkom	Baltkom GSM	GSM-9/18	Mar 97	130,940	139,800 *
LMT	LMT-GSM	GSM-9/18	Jan 95	258,980	272,000 *
Lithuania				**481,950**	**508,130**
Bité	Bité	GSM-9/18	Nov 95	170,000	178,900 *
Omnitel	Omnitel GSM	GSM-9/18	Mar 95	309,000	325,800 *
Tele2	Tele2	GSM-1800	Dec 99	2,950 *	3,430 *

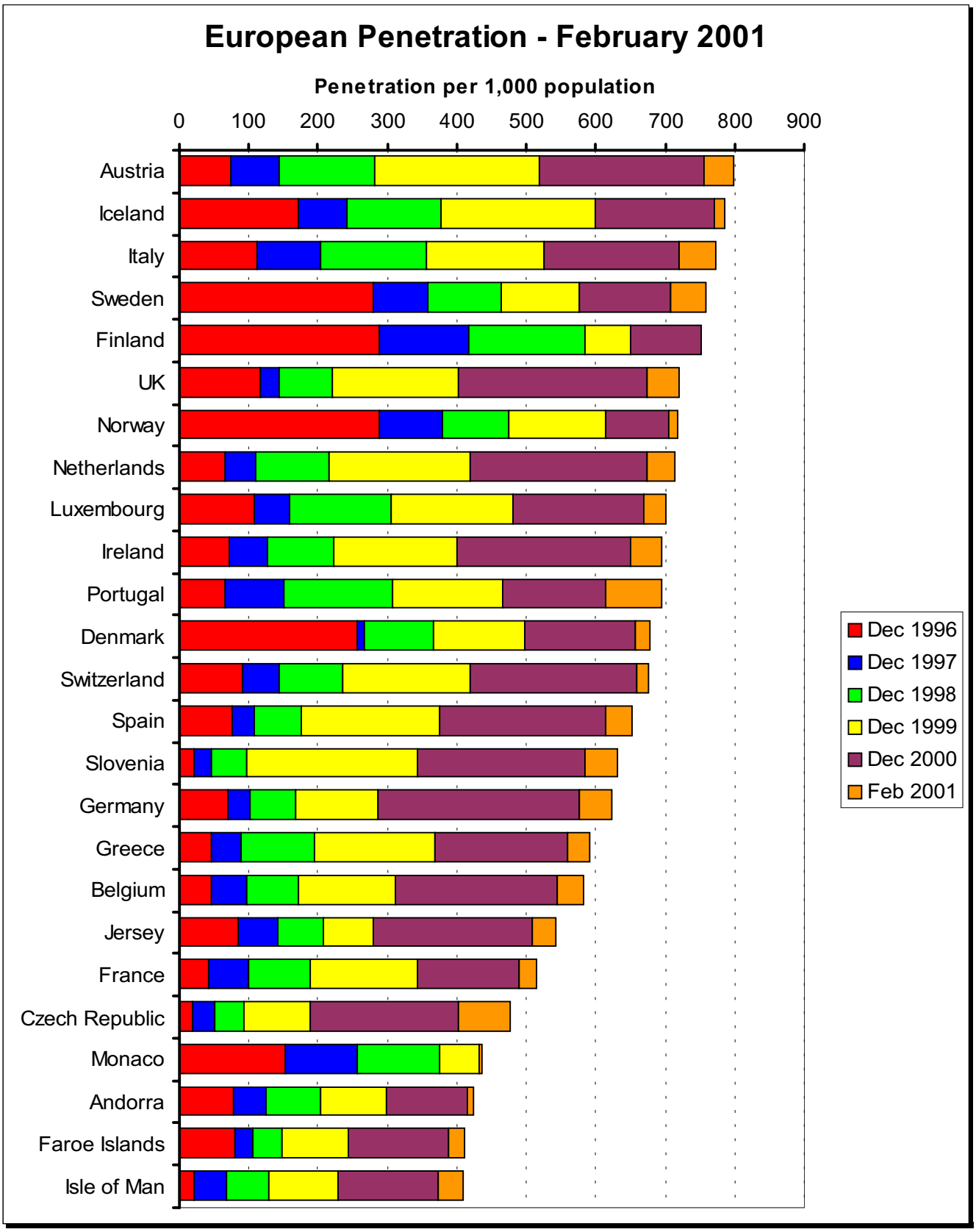
Operator	Network	System	On Air	Dec 2000	Feb 2001
Luxembourg				**294,400**	**309,400**
P&T	LuxGSM	GSM-9/18	Jun 93	171,400 *	178,400 *
Société Européenne de Communication	TANGO	GSM-9/18	May 98	123,000 *	131,000 *
Macedonia				**98,450**	**106,320**
PTT Macedonia	MobiMak	GSM-900	Oct 96	98,450	106,320
Malta				**93,440**	**103,800**
Vodafone Malta		GSM-900	Jul 97	93,440	103,800 *
Moldova				**121,850**	**141,200**
Moldcell		GSM-900	Mar 2000	50,500	61,600 *
Voxtel	Voxtel	GSM-900	Oct 98	71,350	79,600 *
Monaco				**13,000**	**13,100**
Monacell		GSM-900	Mar 95	13,000 *	13,100 *
Montenegro				**136,540**	**149,600**
Monet	Monet	GSM-900	Jul 2000	47,100 *	55,500 *
ProMonte GSM	ProMonte GSM	GSM-900	Jul 96	89,440	94,100 *
Netherlands				**10,720,500**	**11,394,700**
Ben Nederland		GSM-1800	Feb 99	850,000	942,500 *
Dutchtone	Dutchtone	GSM-1800	Jan 99	1,033,500 *	1,140,400 *
KPN		GSM-9/18	Jul 94	4,800,000	5,028,700 *
Libertel		GSM-9/18	Sep 95	3,180,000	3,342,200 *
Telfort	Pak&Bel	GSM-1800	Oct 98	857,000	940,900 *
Norway				**3,008,000**	**3,091,200**
NetCom	NetCom	GSM-900	Sep 93	850,000	868,500 *
Telenor Mobil	Telenor Mobil	GSM-9/18	May 93	2,158,000	2,222,700 *
Poland				**6,640,000**	**7,110,200**
Centertel	Idea	GSM-9/18	Mar 98	1,380,000	1,514,800 *
Polkomtel	Plus GSM	GSM-9/18	Oct 96	2,460,000	2,617,800 *
Polska Telefonia Cyfrowa	Era GSM	GSM9/18	Sep 96	2,800,000	2,977,600 *
Portugal				**6,664,690**	**6,992,100**
Optimus	Optimus	GSM-9/18	Sep 98	1,410,410	1,507,200 *
Telecel	Telecel	GSM-9/18	Oct 92	2,315,280	2,411,200 *
TMN	Telemovel	GSM-9/18	Oct 92	2,939,000	3,073,700 *
Romania				**2,387,200**	**2,563,700**
CosmoRom		GSM-1800	Mar 2000	40,000	48,700 *
MobiFon	Connex GSM	GSM-900	Apr 97	1,171,800	1,251,900 *
Mobil Rom	Dialog GSM	GSM-900	Jun 97	1,175,400 *	1,263,100 *
Russia				**2,713,450**	**2,955,030**
Moscow : KB Impuls	Bee Line GSM	GSM-9/18	Dec 97	375,000	417,800 *
Moscow : Mobile Telesystems	MTS	GSM-9/18	Jul 94	1,107,000	1,235,400 *
Moscow : Personal Communications	SONET	CDMA-800	Dec 98	40,000	44,200 *
Moscow : Vimpelcom	Bee Line 800	US TDMA-800	Jan 94	394,500	427,600 *
St Petersburg : North West GSM	North West GSM	GSM-9/18	Dec 94	253,320	273,800 *
Other - CDMA-800		CDMA-800		41,590	32,950
Other - GSM-900		GSM-900		442,060	460,420
Other - US TDMA-800		US TDMA-800		59,980	62,860
Serbia				**1,205,150**	**1,346,200**
Mobtel 063	Mobtel 063	GSM-900	Nov 96	765,000	851,000 *
Telekom Srbija		GSM-900	Aug 98	440,150	495,200 *
Slovak Republic				**1,045,750**	**1,111,200**
Eurotel Bratislava	Eurotel GSM	GSM-900	Feb 97	476,750	513,700 *
Globtel	Globtel	GSM-900	Jan 97	569,000 *	597,500 *
Slovenia				**1,093,840**	**1,177,600**
Mobitel		GSM-900	Jul 96	966,950	1,036,000 *
Simobil		GSM-900	Mar 99	126,890	141,600 *

Operator	Network	System	On Air	Dec 2000	Feb 2001
Spain				**24,052,000**	**25,846,900**
Airtel	Airtel	GSM-9/18	Oct 95	6,990,000	7,400,000 *
Retevisión Móvil	Amena	GSM-1800	Jan 99	3,720,000	4,184,600 *
Telefónica	MoviStar	GSM-9/18	Jul 95	13,342,000	14,262,300 *
Sweden				**6,338,000**	**6,576,100**
Comviq	Comviq GSM	GSM-9/18	Sep 92	2,087,000	2,157,800 *
Europolitan	Europolitan	GSM-900	Sep 92	994,000	1,019,100 *
Telia Mobitel	Telia Mobitel GSM	GSM-9/18	Nov 92	3,257,000	3,399,200 *
Switzerland				**4,716,800**	**4,922,800**
Orange		GSM-1800	Jun 99	898,800 *	998,000 *
sunrise		GSM-9/18	Dec 98	650,000	610,400 *
Swisscom	Natel	GSM-9/18	Mar 93	3,168,000	3,314,400 *
Tadjikistan				**230**	**290**
Somoncom	Somoncom	GSM-900	Mar 00	230	290 *
Turkey				**16,100,000**	**17,413,000**
Telsim		GSM-900	Mar 94	6,000,000	6,569,200 *
Turkcell		GSM-900	Feb 94	10,100,000	10,843,800 *
UK				**39,891,300**	**42,767,000**
BT Cellnet	Cellnet	GSM-900	Jul 94	10,244,000	10,837,400 *
One-2-One	One-2-One	GSM-1800	Sep 93	8,324,300	9,019,400 *
Orange	Orange	GSM-1800	Apr 94	9,834,000	10,728,200 *
Vodafone	Vodafone	GSM-900	Dec 91	11,489,000	12,182,000 *
Ukraine				**794,500**	**955,900**
Digital Cellular Communications of Ukrair	DCC	US TDMA-800	Oct 96	40,000	41,100 *
Golden Telecom		GSM-1800	Dec 96	38,000	40,200 *
Kyivstar GSM		GSM-900	Dec 97	300,000	340,000 *
Ukraine Radio Systems	WellCOM	GSM-900	Oct 98	26,500	28,600 *
Ukrainian Mobile Communications		GSM-900	Sep 97	390,000	506,000
Uzbekistan				**126,210**	**134,030**
Buztel		GSM-900	Aug 97	11,000 *	11,600 *
Coscom		GSM-900	Jun 97	16,030	17,200 *
Daewoo Central Paging Co	Unitel	GSM-900	Oct 97	36,900 *	39,900 *
Rubicon Wireless		US TDMA-800	Aug 96	3,480 *	3,530 *
Uzdunrobita		US TDMA-800	1994	45,800 *	48,400 *
Uzmacom	Uzmacom	GSM-900	Aug 97	13,000 *	13,400 *
Total - Digital				**284,111,300**	**303,600,940**

Analogue/digital celullar market penetration (February 2001)

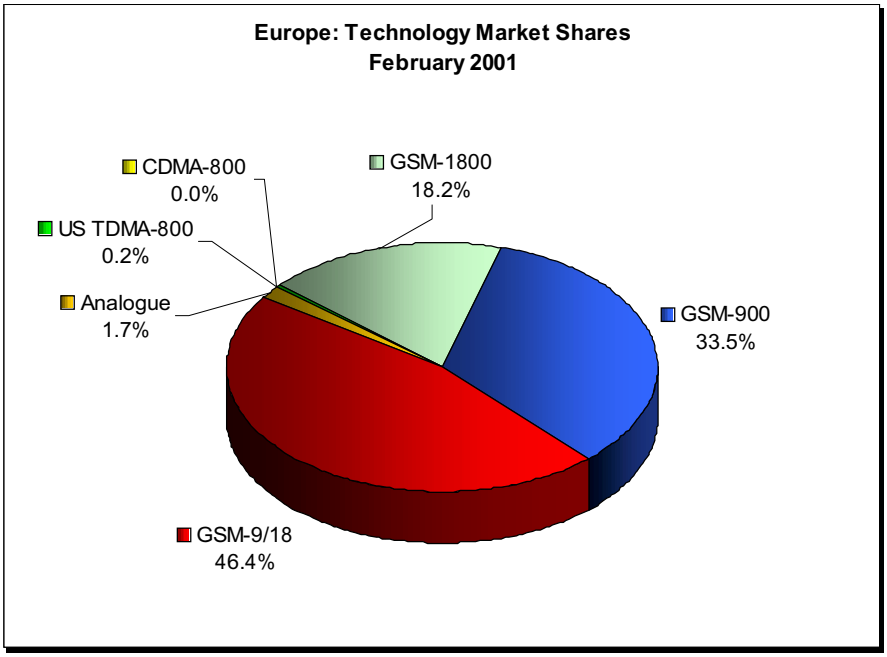
Penetration per 1,000 population

Country	Analogue subscribers	Digital subscribers	Total subscribers	Population (m)	Penetration
Albania	0	32,600	32,600	3.51	9.28
Andorra	0	28,400	28,400	0.07	423.88
Armenia	0	17,000	17,000	3.34	5.10
Austria	141,700	6,357,200	6,498,900	8.14	798.29
Azerbaijan	7,250	512,400	519,650	7.76	66.93
Belarus	18,500	23,900	42,400	10.36	4.09
Belgium	0	5,978,800	5,978,800	10.26	582.79
Bosnia Herzegovina	0	261,400	261,400	3.89	67.15
Bulgaria	174,700	631,300	806,000	7.74	104.11
Croatia	78,100	941,600	1,019,700	4.32	236.15
Cyprus	1,120	254,010	255,130	0.76	334.38
Czech Republic	66,800	4,823,000	4,889,800	10.27	476.31
Denmark	40,440	3,584,700	3,625,140	5.35	678.10
Estonia	0	570,600	570,600	1.43	400.14
Faroe Islands	3,830	14,700	18,530	0.05	411.78
Finland	51,000	3,829,720	3,829,720	5.18	752.65
France	0	30,664,500	30,664,500	59.52	515.19
Georgia	14,550	125,500	140,050	5.00	28.01
Germany	0	51,726,200	51,726,200	82.95	623.55
Gibraltar	0	5,900	5,900	0.03	218.52
Greece	0	6,280,300	6,280,300	10.62	591.64
Greenland	4,920	10,400	15,320	0.06	273.57
Guernsey	0	25,100	25,100	0.06	392.19
Hungary	82,300	3,734,900	3,817,200	10.12	377.31
Iceland	27,980	189,570	217,550	0.28	785.38
Ireland	24,400	2,628,700	2,653,100	3.82	695.26
Isle of Man	0	30,300	30,300	0.07	409.46
Italy	2,679,700	41,921,200	44,600,900	57.70	772.99
Jersey	0	47,630	47,630	0.09	541.25
Kazakhstan	57,090	242,800	299,890	16.71	17.95
Kirghizstan	8,690	5,310	14,000	4.72	2.97
Latvia	8,030	411,800	419,830	2.39	175.96
Lithuania	5,370	508,130	513,500	3.61	142.13
Luxembourg	0	309,400	309,400	0.44	701.59
Macedonia	0	106,320	106,320	2.05	51.96
Malta	0	103,800	103,800	0.39	264.12
Moldova	0	141,200	141,200	4.43	31.84
Monaco	0	13,100	13,100	0.03	422.58
Montenegro	0	149,600	149,600	0.68	219.68
Netherlands	0	11,394,700	11,394,700	15.95	714.45
Norway	130,600	3,091,200	3,221,800	4.49	716.91
Poland	109,500	7,110,200	7,219,700	38.65	186.81
Portugal	0	6,992,100	6,992,100	10.06	695.04
Romania	23,700	2,563,700	2,587,400	22.38	115.62
Russia	679,030	2,955,030	3,634,060	145.77	24.93
Serbia	7,700	1,346,200	1,353,900	10.00	135.44
Slovak Republic	15,800	1,111,200	1,127,000	5.42	208.05
Slovenia	41,000	1,177,600	1,218,600	1.93	631.73
Spain	268,100	25,846,900	26,115,000	40.04	652.24
Sweden	152,700	6,576,100	6,728,800	8.87	758.26
Switzerland	0	4,922,800	4,922,800	7.28	675.84
Tadjikistan	1,810	290	2,100	6.52	0.32
Turkey	86,100	17,413,000	17,499,100	66.13	264.61
Turkmenistan	10,300	0	10,300	4.57	2.25
UK	118,600	42,767,000	42,885,600	59.60	719.54
Ukraine	56,000	955,900	1,011,900	48.94	20.68
Uzbekistan	0	134,030	120,630	25.05	4.82
Total - Feb 2001	**5,197,410**	**303,600,940**	**308,733,950**	**869.82**	**354.94**



Celullar systems summary (February 2001)

System	Country	Subscribers	Share
AMPS	Georgia, Kazakhstan, Kirghizstan, Russia, Tadjikistan, Turkmenistan	403,080	0.1%
CDMA-800	Russia	77,150	0.0%
GSM-1800	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Spain, Switzerland, UK, Ukraine	56,150,930	18.2%
GSM-900	Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Faroe Islands, France, Georgia, Germany, Gibraltar, Greece, Greenland, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Jersey, Kazakhstan, Kirghizstan, Macedonia, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Sweden, Turkey, UK, Ukraine, Uzbekistan	103,471,100	33.5%
GSM-9/18	Austria, Belgium, Estonia, Finland, France, Hungary, Italy, Latvia, Lithuania, Luxembourg, Norway, Portugal, Russia, Spain, Sweden, Switzerland	143,336,270	46.4%
NMT-450	Belarus, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, Hungary, Iceland, Latvia, Lithuania, Moldova, Norway, Poland, Romania, Russia, Slovak Republic, Slovenia, Sweden, Turkey, Ukraine	1,488,490	0.5%
NMT-900	Cyprus, Denmark, Faroe Islands, Finland, Greenland, Norway, Serbia, Sweden	60,720	0.0%
TACS	Austria, Azerbaijan, Ireland, Italy, Malta, Spain, UK	3,239,750	1.0%
US TDMA-800	Russia, Ukraine, Uzbekistan	583,490	0.2%
Total - February 2001		**308,810,980**	**100.0%**



Special Supplement

Cellular network infrastructure suppliers - Eastern Europe

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Albania						
AMC	AMC Mobil	GSM-900	Alcatel	BTS	1	-
Armenia						
Armentel		GSM-900	Motorola	-	-	-
Armentel		GSM-900	Siemens	BTS	MSC	-
Azerbaijan						
Azercell	Azercell	GSM-900	Ericsson	94	2	-
Bakcell		GSM-900	Alcatel	BTS	MSC	-
Bakcell		TACS	Motorola	BTS	MSC	-
Delta International		NMT-450	(unknown)	-	-	-
Belarus						
Belcel		NMT-450	Ericsson	BTS	1	-
Beltelecom	GSM trial	GSM-900	Siemens [Withdrawn]	BTS	MSC	-
MDS Velkom	Velkom	GSM-900	Ericsson Nikolai Tesla	BTS	MSC	-
Bosnia Herzegovina - Muslim-Croat Federation						
Public Enterprise PTT		GSM-900	Ericsson	BTS	MSC	-
Bosnia Herzegovina - Republika Srpska						
Telekom Srpska	Mobilna Srpska	GSM-900	Siemens	BTS	MSC	-
Bulgaria						
Mobikom	Mobifon	NMT-450	Ericsson	365	4	-
MobilTel	M-TEL	GSM-900	Nortel	80	1	-
MobilTel	M-TEL	GSM-900	Siemens	100	1	-
Croatia						
HPT	Cronet	GSM-900	Siemens	12	1	-
HPT		NMT-450	Ericsson	-	1	-
VIP-Net		GSM-900	Ericsson	BTS	MSC	-
Czech Republic						
Cesky Mobil	Oskar	GSM-9/18	Ericsson	BTS	MSC	GPRS
EuroTel Prague	EuroTel GSM	GSM-900	Nokia	2,000	11	GPRS
EuroTel Prague	T!P	NMT-450	Ericsson	395	4	-
EuroTel Prague	T!P	NMT-450	Nokia	395	4	-
RadioMobil	Paegas	GSM-900	Motorola	>1,300	-	GPRS
RadioMobil	Paegas	GSM-900	Siemens	-	7	-
Estonia						
Eesti Mobiil Telefon	EMT-GSM	GSM-900	Ericsson	130	MSC	-
Eesti Mobiil Telefon	EMT-GSM	GSM-900	Nokia	-	-	-
Eesti Mobiil Telefon	EMT-GSM	GSM-9/18	Nokia	-	-	-
Eesti Mobiil Telefon		GSM-9/18	Ericsson	BTS	MSC	-
Eesti Mobiil Telefon		NMT-450	Ericsson	-	-	-
Eesti Mobiil Telefon		NMT-450	Nokia	B	-	-
Eesti Mobiil Telefon		NMT-900	Ericsson [Withdrawn]	-	-	-
Eesti Mobiil Telefon		NMT-900	Nokia [Withdrawn]	B	-	-
Radiolinja Estonia	Eurofon 256	GSM-900	Motorola	-	-	-
Radiolinja Estonia	Eurofon 256	GSM-900	Nokia	BTS	MSC	-
Ritabell	Q GSM	GSM-900	Siemens	BTS	MSC	-
Georgia						
Geocell		GSM-900	Ericsson	BTS	MSC	-
Magticom		GSM-900	Motorola	B	-	GPRS
Magticom		GSM-900	Siemens	-	1	-
Megacom	Megacom	AMPS	Plexsys	-	MSC	-
Hungary						
Pannon GSM	Pannon GSM	GSM-900	Nokia	950	8	-
Vodafone Hungary		GSM-9/18	Nokia	BTS	MSC	-
Westel	Eurofon	GSM-900	Nortel	300	-	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Hungary						
Westel	Westel	NMT-450	Ericsson	420	4	-
Westel	Westel	NMT-450	Nokia	20	-	-
Westel 900	Eurofon	GSM-900	Ericsson	1,200	8	GPRS
Westel 900	Eurofon	GSM-900	Motorola	-	-	GPRS
Kazakhstan						
GSM Kazakhstan	KCell	GSM-900	Ericsson	-	-	-
Kirghizstan						
ICG/Katel	Bee Line	AMPS	Ericsson	BTS	MSC	-
Latvia						
Baltcom	Baltcom GSM	GSM-900	Nortel	88	MSC	-
LMT	LMT-GSM	GSM-900	Nokia	17	1	-
LMT		NMT-450	Nokia	45	1	-
Lithuania						
Comliet UAB		NMT-450	Nokia	56	1	-
Lietuvos Telekomas		GSM-900	Ericsson	BTS	MSC	-
Litcom	Omnitel GSM	GSM-900	Motorola	66	-	GPRS
Mobilios Telekomunikacijos	Bité	GSM-9/18	Ericsson	65	MSC	-
Omnitel	Omnitel GSM	GSM-900	Nokia	-	MSC	-
Omnitel	Omnitel GSM	GSM-900	Siemens	-	1	-
Macedonia						
PTT Macedonia	Mobimak	GSM-900	Ericsson	c50	MSC	-
Moldova						
Cellular Communications BT		US TDMA-800	Ericsson	BTS	MSC	-
Voxtel		GSM-900	Alcatel (tbc)	BTS	MSC	-
Voxtel		NMT-450	Hans Damm	BTS	MSC	-
Montenegro						
ProMonte GSM		GSM-900	Ericsson	28	1	-
Poland						
Centertel	Idea	GSM-1800	Nokia	>2,100	>3	GPRS
Centertel	Idea	GSM-1800	Nortel	>750	-	-
Centertel	Idea	GSM-9/18	Ericsson	>110	>1	-
Centertel		NMT-450	Ericsson	>220	2	-
Centertel		NMT-450	Nokia	485	5	-
Polkomtel	Plus GSM	GSM-900	Nokia	2,800	17	GPRS
Polska Telefonia Cyfrowa	Era GSM	GSM-9/18	Alcatel	>70	-	-
Polska Telefonia Cyfrowa	Era GSM	GSM-9/18	Ericsson	>1,500	>8	GPRS
Polska Telefonia Cyfrowa	Era GSM	GSM-9/18	Siemens	>1,500	>7	-
Romania						
MobiFon	Connex GSM	GSM-900	Ericsson	580	7	-
MobiFon	Connex GSM	GSM-900	Nortel	60	-	-
Mobil Rom	Dialog	GSM-900	Alcatel	>300	5	-
Mobil Rom	Dialog	GSM-900	Motorola	>300	-	-
Telemobil		NMT-450	Ericsson	90	2	-
Telemobil		NMT-450	Radio Design UK	60	-	-
Russia - Central & Central Chernozem Regions ; Belgorodskaya Obl						
Belgorod Cellular Communications		AMPS	Stanilite	-	-	-
Russia - Central & Central Chernozem Regions ; Bryanskaya obl						
Bryansk Cellular Networks	Rosstar	NMT-450	Nokia	BTS	-	-
Bryansksvyazinform		AMPS	Lucent	-	-	-
Russia - Central & Central Chernozem Regions ; GSM-1800						
KB Impuls	Bee-line 1800	GSM-1800	Alcatel	110	1	-
Russia - Central & Central Chernozem Regions ; Ivanovskaya Obl						
Ivtelecom		CDMA-800	Samsung	BTS	MSC	-
now Ivtelecom/CDMA		AMPS	Samsung	-	-	-
Russia - Central & Central Chernozem Regions ; Kurskaya Obl						
Kursk Cellular Communications		AMPS	Motorola	-	-	-
Russia - Central & Central Chernozem Regions ; Lipetskaya Obl						
Lipetsk Mobile		AMPS	Lucent	-	-	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Russia - Central & Central Chernozem Regions ; Nizhegorodskaya Obl						
Nizhegorodskaya Cellular Communication		GSM-900	Alcatel	18	1	-
Personal Systems Network		AMPS	Motorola	-	-	-
Russia - Central & Central Chernozem Regions ; Ryazanskaya Obl						
Optimum Communications	Beeline	AMPS	Plexsys	-	MSC	-
RTK Ryazan		GSM-900	Alcatel	-	-	-
Ryazan cellular Communications		NMT-450	Ericsson	-	-	-
Russia - Central & Central Chernozem Regions ; Smolenskaya Obl						
Smolensk Cellular Communications	Bee Line	AMPS	Celcore	3	1	-
Smolensk Mobile Networks		NMT-450	Ericsson	-	-	-
Russia - Central & Central Chernozem Regions ; Tambovskaya Obl						
MTS/ReCom	Tambov GSM-900	GSM-900	Siemens	-	MSC	-
Russia - Central & Central Chernozem Regions ; Tulskaya Obl						
TSRS	TCC	NMT-450	Nokia	B	MSC	-
Russia - Central & Central Chernozem Regions ; Tverskaya Obl						
Tver Cellular Communications		NMT-450	Ericsson	BTS	MSC	-
Russia - Central & Central Chernozem Regions ; Vladimirskaya Obl						
Bee Line Vladimir	Bee Line	AMPS	Plexsys	BTS	MSC	-
VladTelecom		NMT-450	Ericsson	-	-	-
Russia - Central & Central Chernozem Regions ; Voronezhskaya Obl						
Votek Mobile		AMPS	Lucent	BTS	MSC	-
Russia - Central & Central Chernozem Regions ; Yaroslavskaya Obl						
Yartelecom		GSM-900	(unknown)	BTS	MSC	-
Yartelecom		NMT-450	Nokia	B	MSC	-
Russia - Far East Region ; Amurskaya Obl						
Daltelecom, Blagoveshchensk		AMPS	Lucent	BTS	MSC	-
United Telecom, Blagoveshchensk		GSM-900	(unknown)	-	-	-
Russia - Far East Region ; Buryatia Repbulic						
Elektrosvyaz		GSM-900	Italtel	-	-	-
Russia - Far East Region ; Chitinskaya Obl						
Sib Inter Telcom		GSM-900	Alcatel	-	-	-
Sib Inter Telcom		GSM-900	Motorola	-	-	-
Russia - Far East Region ; GSM-1800						
Primtelefon		GSM-1800	Ericsson	BTS	MSC	-
Russia - Far East Region ; Irkutskaya Obl						
Baikalwestcom		NMT-450	Ericsson	BTS	MSC	-
Baikalwestcom		NMT-450	Nokia	17	-	-
Millicom	Severnaya Korona	AMPS	Celcore	BTS	MSC	-
Severnaya Korona/Bee-Line		US TDMA-800	Ericsson	BTS	MSC	-
Russia - Far East Region ; Kamchatskaya Obl						
Daltelecom, Petropavlovsk-Kamchatskii	Bee-Line	AMPS	Lucent	BTS	MSC	-
Russia - Far East Region ; Khabarovskii Krai						
Daltelecom, Khabarovsk/Beeline		AMPS	Lucent (AT&T)	c3	1	-
Far-Eastern Cellular Systems-900		GSM-900	Alcatel	BTS	MSC	-
Russia - Far East Region ; Magadanskaya Obl						
Magadaninformsvyaz		AMPS	Lucent	-	-	-
Russia - Far East Region ; Primorskii Krai						
AKOS Vladivostok		AMPS	Alcatel	-	MSC	-
AKOS Vladivostok		AMPS	Hughes	BTS	-	-
NTC Vladivostok		GSM-900	Motorola	BTS	-	-
NTC Vladivostok		GSM-900	Siemens	BTS	MSC	-
Primtelefon, Vladivostok		NMT-450	Ericsson	23	MSC	-
Primtelefon, Vladivostok		NMT-450	Nokia	BTS	-	-
Vladivostok - Commstruct	Abandoned	NMT-450	(unknown)	-	-	-
Russia - Far East Region ; Sakhalinskaya Obl						
Crilion S		GSM-900	(unknown)	-	-	-
Sakhalin Telecom Mobile		AMPS	Ericsson	BTS	MSC	-
Russia - Far East Region ; Yakut-Sakha Republic						
Gorizont-RT, Yakutsk		GSM-900	Italtel	-	-	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Russia - Federal Network - SOTEL						
Multiregional Transit Telecom		NMT-450	Ericsson	-	10	-
Multiregional Transit Telecom		NMT-450	Nokia	B	MSC	-
Russia - Moscow & Moscow Oblast ; Moscow						
KB Impuls	Bee Line 1800	GSM-1800	Alcatel	110	1	-
KB Impuls	Bee Line GSM	GSM-9/18	Alcatel	BTS	MSC	-
KB Impuls	Bee Line GSM	GSM-9/18	Nokia	-	-	GPRS
Mobile Telesystems	MTS	GSM-900	Motorola	500	-	GPRS
Mobile Telesystems	MTS	GSM-900	Siemens	BTS	MSC	-
Moscow Cellular Communications	MCC	NMT-450	Ericsson	88	MSC	-
Moscow Cellular Communications	MCC	NMT-450	Nokia	87	-	-
MTS (Rosico)	MTS	GSM-1800	Siemens	20	-	-
RCC		AMPS	Motorola	-	-	-
Vimpelcom	Bee Line	US TDMA-800	Ericsson	BTS	MSC	-
Russia - Moscow & Moscow Oblast ; Moskovskaya Obl						
Mobile Telesystems	MTS	GSM-900	Motorola	500	-	-
Mobile Telesystems	MTS	GSM-900	Siemens	BTS	1	-
Moscow Cellular Communications	MCC	NMT-450	Ericsson	88	-	-
Moscow Cellular Communications	MCC	NMT-450	Nokia	87	-	-
VimpelCom	Bee Line	AMPS	Plexsys [Withdrawn]	16	8	-
Vimpelcom	Bee Line	US TDMA-800	Ericsson	BTS	MSC	-
Russia - Moscow & Moscow Oblast; Moscow						
MTS (Rosico)	MTS	GSM-9/18	Motorola	-	-	-
Russia - North Caucasus Region ; Dagestan Republic						
Dagestan Cellular Communications		AMPS	Samsung	BTS	MSC	-
Russia - North Caucasus Region ; Ingushetia						
Imperativ		AMPS	Celcore	BTS	MSC	-
Russia - North Caucasus Region ; Kabardino-Balkaria Republic						
Nalchik Cellular Communications		AMPS	Lucent	-	-	-
Russia - North Caucasus Region ; Krasnodarskii Krai						
IST/Kubanelektrosvyaz	Krasnodar Cellular	NMT-450	Ericsson	33	MSC	-
Kubanelektrosvyaz	Kuban GSM	GSM-900	Ericsson	33	MSC	-
Tekhinfo	Techinfo	AMPS	Hughes	BTS	-	-
Tekhinfo	Tekhinfo	AMPS	Alcatel	-	MSC	-
Tekhinfo		AMPS	Stanilite	-	-	-
Russia - North Caucasus Region ; Rostovskaya Obl						
Dontelecom		GSM-900	Alcatel	-	-	-
Dontelecom		GSM-900	Motorola	BTS	-	-
Dontelecom		GSM-900	Siemens	BTS	MSC	-
Rostov Cellular Communications/Beeline	Beeline	US TDMA	Ericsson	-	-	-
Russia - North Caucasus Region ; Stavropolskii Krai						
Stavropol Cellular Communications		AMPS	Plexsys	-	-	-
Stavropol Cellular Communications		NMT-450	Nokia	-	-	-
Stavtelesot	Stavtelesot	GSM-900	Alcatel	BTS	MSC	-
Russia - North & North-West Regions ; Arkhangelskaya Obl						
Arkhangelsk Mobile		AMPS	Lucent	-	-	-
Artelecom		NMT-450	Ericsson	-	-	-
Russia - North & North-West Regions ; Kaliningradskaya Obl						
Extel Mobile Communications		GSM-900	Siemens	5	1	-
Kaliningrad Mobile Networks		NMT-450	Ericsson	-	-	-
Svyazinform		AMPS	Plexsys	-	MSC	-
Russia - North & North-West Regions ; Karelia Republic						
Alpha Telecom		NMT-450	(unknown)	9	1	-
Russia - North & North-West Regions ; Murmanskaya Obl						
Murmansk Mobile		AMPS	Lucent	-	-	-
Tele-Nord		NMT-450	Nokia	-	MSC	-
Russia - North & North-West Regions ; Novgorodskaya Obl						
Novgorod Mobile Telephone		GSM-900	Nokia (tbc)	-	-	-
Novgorod Telecommunications	UNICEL	AMPS	Lucent	BTS	MSC	-
Novgorod Telecommunications	UNICEL	US TDMA	Ericsson	BTS	1	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Russia - North & North-West Regions ; Pskovskaya Obl						
RTK Pskov		GSM-900	(unknown)	-	-	-
Russia - North & North-West Regions ; St Petersburg						
Delta Telecom		NMT-450	Ericsson	-	-	-
Delta Telecom		NMT-450	Nokia	73	MSC	-
North West DCS	NWGSM	GSM-1800	Nokia	3	-	-
North West DCS	NWGSM	GSM-1800	Siemens	-	1	-
North West GSM	North West GSM	GSM-900	Nokia	283	2	-
St Petersburg Telecom	FORA	AMPS	Motorola	BTS	MSC	-
Telecom XXI		GSM-1800	Ericsson	5	1	-
Russia - Siberia Region ; Altaiskii Krai						
Altaisvyaz		AMPS	Plexsys (tbc)	-	-	-
Yuzhno-Sibirskaya Cellular Communications		NMT-450	Nokia	-	-	-
Russia - Siberia Region ; Kemerovskaya Obl						
Kemerovo Cellular Communications		GSM-900	Italtel	-	-	-
Kemerovo Mobile Communications		US TDMA	Ericsson	-	-	-
Russia - Siberia Region ; Krasnoyarskii Krai						
Sibchallenge	Bee-Line	AMPS	Ericsson	BTS	MSC	-
Yeniseitelecom/Elektrosvyaz Krasnoyarsk		NMT-450	Ericsson	BTS	MSC	-
Russia - Siberia Region ; Novosibirskaya Obl						
Cellular Company (Novosibirsk)		N-AMPS	Motorola	16	MSC	-
Siberian Cellular Systems 900		GSM-900	Alcatel	BTS	MSC	-
Russia - Siberia Region ; Omskaya Obl						
Mobile Communication Systems		GSM-900	Siemens	-	MSC	-
Siberian Cellular Communications	Beeline	US TDMA-800	Ericsson	BTS	MSC	-
Russia - Siberia Region ; Taymyr Okr						
Gorno-Metallurgicheskii Kombinat		AMPS	Lucent	-	-	-
Russia - Siberia Region ; Tomskaya Obl						
000 Tomsk Cellular Communication		GSM-900	Ericsson	BTS	MSC	-
Tomsk Telecom		NMT-450	Ericsson	-	-	-
Tomsk Telecom		NMT-450	Nokia	BTS	-	-
Russia - Urals Region ; Chelyabinskaya Obl						
Chelyabinsk Cellular Communications		NMT-450	(unknown)	BTS	MSC	-
Chelyabinsk Cellular Communications/Beelir		AMPS	Ericsson	BTS	MSC	-
Chelyabinsk Cellular Communications/Beelir		US TDMA	Ericsson	BTS	MSC	-
South Urals Cellular Telephone		GSM-900	Alcatel	BTS	MSC	-
Svyazinform Chelyabinsk		CDMA-800	Qualcomm	BTS	MSC	-
Russia - Urals Region ; Khanti-Mansiysk Okr						
Khantimansiyskokrtelecom		GSM-900	Italtel	BTS	MSC	-
Russia - Urals Region ; Kirovskaya Obl						
Kirovtelecom		AMPS	Lucent	BTS	MSC	-
Russia - Urals Region ; Komi Republic						
Parma Mobile		AMPS	Lucent	BTS	MSC	-
Russia - Urals Region ; Orenburgskaya Obl						
ABC Conti/Orensot	Orensot	US TDMA	Ericsson	BTS	MSC	-
SP-900		GSM-900	Italtel	-	-	-
Russia - Urals Region ; Permskaya Obl						
Uralsviazinform		GSM-900	Alcatel	BTS	MSC	-
Uralsvyazinform		NMT-450	Nokia	9	1	-
Russia - Urals Region ; Sverdlovskaya Obl						
Beeline Yekaterinburg		AMPS	Plexsys	BTS	MSC	-
Beeline Yekaterinburg		US TDMA	Ericsson	BTS	MSC	-
Uraltel		GSM-900	Siemens	-	MSC	-
Uralwestcom		NMT-450	Ericsson	BTS	MSC	-
Russia - Urals Region ; Tyumenskaya Obl						
Purneftgaz		AMPS	Samsung	-	-	-
Siberian Cellular Communications (Tyumen)	Bee-Line	AMPS	Plexsys	-	-	-
Yermak RMS		GSM-900	Italtel	BTS	MSC	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Russia - Urals Region ; Udmurtia Republic						
Udmurt Telecom, Izhevsk		GSM-900	Ericsson	BTS	MSC	-
Udmurt Telecom, Izhevsk		NMT-450	Ericsson	BTS	MSC	-
Udmurtia Cellular Communications		US TDMA	Ericsson	-	-	-
Russia - Volga Region ; Astrakhanskaya Obl						
Astrakhan Mobile		AMPS	Lucent	-	-	-
Russia - Volga Region ; Bashkortostan Republic						
Bashtelecom		GSM-900	Ericsson (tbc)	-	1	-
Cellular Communication of Bashkortostan		NMT-450	Ericsson	-	-	-
Russia - Volga Region ; Chuvash Republic						
Chuvashia Mobile		AMPS	Lucent	-	-	-
Russia - Volga Region ; Mari El Republic						
Mar Mobile		AMPS	Lucent	-	-	-
Russia - Volga Region ; Mordovia Republic						
Saransk Elektrosvyaz (?)		GSM-900	Ericsson	BTS	MSC	-
Russia - Volga Region ; Penzenskaya Obl						
Penza Mobile		AMPS	Lucent	-	-	-
Russia - Volga Region ; Samarskaya Obl						
Beeline Samara	Beeline	AMPS	Plexsys	BTS	1	-
Beeline Samara	Beeline	US TDMA	Ericsson	7	1	-
SMARTS, Samara		GSM-900	Italtel	-	-	-
Russia - Volga Region ; Saratovskaya Obl						
Mobile Communication Systems		GSM-900	Italtel	-	-	-
Saratov Mobile		AMPS	Lucent	-	-	-
Russia - Volga Region ; Tatarstan Republic						
TAIF		GSM-900	Ericsson	122	MSC	-
Tatincom		E-TDMA	Hughes Alcatel	-	-	-
Tatincom		US TDMA	Alcatel	-	2	-
Tatincom		US TDMA	Hughes Alcatel	11	2	-
Russia - Volga Region ; Volgogradskaya Obl						
United Telecom, Volgograd		GSM-900	(unknown)	-	-	-
Volgograd Mobile		AMPS	Lucent	-	-	-
Serbia						
PTT Serbia	Mobtel	GSM-900	Ericsson	68	1	-
PTT Serbia		NMT-900	Ericsson	-	-	-
Telekom Srbija	YUG 03	GSM-900	Ericsson	BTS	MSC	-
Slovak Republic						
Eurotel Bratislava	Eurotel GSM	GSM-900	Ericsson	BTS	MSC	-
Eurotel Bratislava		NMT-450	Nokia	B	MSC	-
Globtel	Globtel	GSM-900	Nortel	B	MSC	GPRS
Slovenia						
Mobitel		GSM-900	Ericsson	60	MSC	-
Mobitel		NMT-450	Ericsson	109	1	-
Mobitel		W-CDMA	Ericsson	-	-	-
Simobil		GSM-900	Siemens	BTS	MSC	-
Tadjikistan						
TadjikTel	Touchfone	AMPS	Motorola	-	-	-
Ukraine						
Digital Cellular Comms		US TDMA-800	Ericsson	-	MSC	-
Golden Telecom		GSM-1800	Motorola	50	-	-
Golden Telecom		GSM-1800	Siemens	-	1	-
Kyivstar GSM	Kyivstar GSM	GSM-900	Ericsson	BTS	MSC	GPRS
Telecel International		CDMA-800	Samsung	-	-	-
Ukraine Radio Systems		GSM-900	Nortel	75	MSC	-
Ukrainian Mobile Communications	UMC	GSM-900	Siemens	BTS	MSC	-
Ukrainian Mobile Communications	UMC	NMT-450	Hans Damm	200	7	-
Ukrainian Mobile Communications	UMC	NMT-450	Nokia	200	7	-
Uzbekistan						
Daewoo Central Paging Co	Unitel GSM	GSM-900	Ericsson	45	2	-
Rubicon Wireless	U-Tel	US TDMA-800	Ericsson	7	MSC	-
Uzdunrobita		US TDMA-800	Nortel	-	-	-
Uzdunrobita		US TDMA-800	Telos	-	-	-
[Uzdunrobita, network closed]		NMT-450	(unknown)	-	-	-

Cellular network infrastructure suppliers - Western Europe

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Andorra						
STA	Mobiland	GSM-900	Motorola	BTS	-	-
STA	Mobiland	GSM-900	Siemens	-	MSC	-
STA		NMT-450	Ericsson	BTS	0	-
Austria						
Connect Austria	One	GSM-1800	Nokia	180	MSC	HSCSD GPRS
MaxMobil	MaxMobil	GSM-900	Siemens	BTS	MSC	-
Mobilkom	A1 - Mobilkom	GSM-900	Alcatel	480	-	-
Mobilkom	A1 - Mobilkom	GSM-900	Motorola	392	-	-
Mobilkom	A1 - Mobilkom	GSM-900	Nokia	BTS	-	-
Mobilkom	A1 - Mobilkom	GSM-900	Nortel	-	2	-
Mobilkom	A1 - Mobilkom	GSM-9/18	Motorola	392	-	GPRS
Mobilkom	A1 - Mobilkom	GSM-9/18	Nokia	BTS	-	-
Mobilkom	A1 - Mobilkom	GSM-9/18	Nortel	-	MSC	-
Mobilkom	Autotelefon-C	NMT-450	Motorola	461	5	-
Mobilkom	DCS-1800 Trial	GSM-1800	Nortel	BTS	MSC	-
Mobilkom	GSM-trial only	GSM-900	Nokia [Withdrawn]	BTS	-	-
Mobilkom	Mobiltelefon-D	TACS	Motorola	623	4	-
Mobilkom		W-CDMA	Ericsson	-	-	-
ONE		W-CDMA	Ericsson	-	-	-
ONE		W-CDMA	Nokia	-	-	-
tele.ring		GSM-1800	Alcatel	BTS	MSC	GPRS
Belgium						
Belgacom Mobile	MOB-2	NMT-450	Ericsson	-	-	-
Belgacom Mobile	MOB-2	NMT-450	Nokia	BTS	-	-
Belgacom Mobile	Proximus	GSM-900	Alcatel	BTS	-	-
Belgacom Mobile	Proximus	GSM-900	Lucent (Philips)	116	-	-
Belgacom Mobile	Proximus	GSM-900	Motorola	500	-	GPRS
Belgacom Mobile	Proximus	GSM-900	Nokia	BTS	-	-
Belgacom Mobile	Proximus	GSM-900	Siemens	-	MSC	-
Belgacom Mobile	Proximus	GSM-9/18	Motorola	BTS	-	GPRS
KPN Orange		GSM-1800	Ericsson	BTS	MSC	-
Mobistar	Mobistar	GSM-900	Alcatel	-	MSC	-
Mobistar	Mobistar	GSM-900	Motorola	500	-	-
Mobistar	Mobistar	GSM-900	Nortel	325	-	-
Mobistar		GSM-900	Nokia	-	-	GPRS
Cyprus						
CYTA	CYTAGSM	GSM-900	Ericsson	874	MSC	-
CYTA		NMT-900	Ericsson	34	MSC	-
Cyprus - Northern Cyprus						
Kibris Telsim		GSM-900	Siemens	-	-	-
KKTCell (N Cyprus Turkcell)		GSM-900	Ericsson (tbc)	70	1	-
Denmark						
Dansk Mobil Telefon	Sonofon	GSM-900	Nokia	315	>2	GPRS
Mobilix	Mobilix	GSM-1800	Nokia	BTS	MSC	GPRS
Tele Danmark Mobil	TDK-GSM	GSM-900	Ericsson	105 cells	1	-
Tele Danmark Mobil		GSM-1800	Ericsson	BTS	MSC	-
Tele Danmark Mobil		GSM-1800	Nokia	BTS	MSC	HSCSD GPRS
Tele Danmark Mobil		GSM-900	Nokia	BTS	MSC	HSCSD
Tele Danmark Mobil		NMT-450	Ericsson	-	-	-
Tele Danmark Mobil		NMT-450	Nokia	B	MSC	-
Tele Danmark Mobil		NMT-900	Ericsson	-	-	-
Tele Danmark Mobil		NMT-900	Nokia	B	MSC	-
Telia		GSM-1800	Ericsson	BTS	MSC	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Faroe Islands						
Faroese Telecom		GSM-900	Ericsson	BTS	MSC	-
Faroese Telecom		NMT-450	Ericsson	BTS	MSC	-
Faroese Telecom		NMT-900	Ericsson	BTS	MSC	-
Finland						
2G	DNA Finland	GSM-900	Ericsson	-	-	GPRS
2G/3G		W-CDMA	Ericsson	-	-	-
2G/3G		W-CDMA	Nokia	BTS	-	-
Ålands Mobiltelefon		W-CDMA	Ericsson	33	-	-
Finnet Group	City Telephone	GSM-1800	Ericsson	BTS	MSC	-
Finnet Group	City Telephone	GSM-1800	Nokia	70	1	-
Finnet Group	City Telephone	GSM-1800	Siemens	BTS	-	-
Finnet Group (Oulun Puhelin Oy)		GSM-1800	Nokia	BTS	MSC	-
Radiolinja		GSM-900	Alcatel [Withdrawn]	-	-	-
Radiolinja		GSM-900	Nokia	BTS	MSC	-
Radiolinja		GSM-900	Philips	-	-	-
Radiolinja		GSM-900	Siemens	-	-	GPRS
Radiolinja		GSM-9/18	Nokia	BTS	MSC	GPRS
Radiolinja		GSM-9/18	Siemens	-	-	GPRS
Sonera		GSM-1800	Ericsson	BTS	-	-
Sonera		GSM-1800	Nokia	BTS	MSC	-
Sonera		GSM-900	Ericsson	BTS	MSC	GPRS
Sonera		GSM-900	Matra	-	-	-
Sonera		GSM-900	Nokia	B	MSC	-
Sonera		GSM-900	Orbitel	-	-	-
Sonera		GSM-9/18	Ericsson	BTS	-	-
Sonera		GSM-9/18	Nokia	BTS	MSC	HSCSD GPRS
Sonera		NMT-450	Ericsson	-	7	-
Sonera		NMT-450	Nokia	B	-	-
Sonera		NMT-900	Nokia	-	MSC	-
Sonera		W-CDMA	Ericsson	BTS	-	-
Sonera		W-CDMA	Nokia	-	-	-
Telephone Company of Vaasa Province Ltd		GSM-1800	Ericsson	BTS	MSC	-
Telia Finland		GSM-1800	Nokia	BTS	1	-
Telia Finland		GSM-1800	Siemens [Withdrawn]	BTS	MSC	-
Telia Finland		W-CDMA	Nokia	-	-	-
Telia Finland		W-CDMA	Siemens	-	-	-
France						
Bouygues Telecom	Bouygues	GSM-1800	Ericsson	6100	27	-
Bouygues Telecom	Bouygues	GSM-1800	Nokia	BTS	MSC	-
Bouygues Telecom	Bouygues	GSM-1800	Nortel	BTS	MSC	GPRS
Cegetel	SFR	GSM-900	Alcatel	>2,000	MSC	GPRS
Cegetel	SFR	GSM-900	Lucent (Philips)	702	-	-
Cegetel	SFR	GSM-900	Motorola	-	-	-
Cegetel	SFR	GSM-900	Nokia	BTS	-	GPRS
Cegetel	SFR	GSM-900	Siemens	-	MSC	-
Cegetel	SFR	NMT-F	Alcatel	900	20	-
Cegetel	SFR	NMT-F	Nokia	B	MSC	-
Cegetel		W-CDMA	Nokia	-	-	-
Cegetel		W-CDMA	Nortel	-	-	-
France Telecom	Itineris	GSM-900	Alcatel	3185	34	GPRS
France Telecom	Itineris	GSM-900	Ericsson	BTS	-	-
France Telecom	Itineris	GSM-900	Matra	BTS	-	-
France Telecom	Itineris	GSM-900	Motorola	BTS	-	GPRS
France Telecom	Itineris	GSM-900	Nokia	BTS	-	-
France Telecom	Itineris	GSM-900	Nortel	BTS	-	-
France Telecom	Itineris	GSM-9/18	Alcatel	BTS	MSC	GPRS
France Telecom	Itineris	GSM-9/18	Ericsson	BTS	-	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
France						
France Telecom	Itineris	GSM-9/18	Matra	BTS	-	-
France Telecom	Itineris	GSM-9/18	Motorola	BTS	-	GPRS
France Telecom	Itineris	GSM-9/18	Nokia	BTS	-	-
France Telecom	Itineris	GSM-9/18	Nortel	BTS	-	-
France Telecom	Itineris	W-CDMA	Alcatel	-	-	-
France Telecom	Itineris	W-CDMA	Nokia	-	-	-
France Telecom	Olla (Toulouse)	GSM-1800	Ericsson	-	-	-
France Telecom	Olla (Toulouse)	GSM-1800	Nortel	-	-	-
France Telecom	Radiocom 2000	RC2000	Alcatel	862	-	-
France Telecom	Radiocom 2000	RC2000	Matra	-	-	-
Germany						
D2		W-CDMA	Ericsson	-	-	-
E-Plus Mobilfunk	E-Plus	GSM-1800	Nokia	>6,500	MSC	-
E-Plus Mobilfunk	E-Plus	GSM-1800	Siemens	BTS	-	-
Group 3G		W-CDMA	Lucent	-	-	-
Mannesmann Mobilfunk	D2	GSM-900	Ericsson	3,000 (E)	28 (E)	HSCSD
Mannesmann Mobilfunk	D2	GSM-900	Siemens	BTS	MSC	GPRS
Mobilcom		W-CDMA	Ericsson	-	-	-
Mobilcom		W-CDMA	Nokia	-	-	-
T-Mobil	D1	GSM-900	Alcatel	2000	-	-
T-Mobil	D1	GSM-900	Ericsson	-	-	GPRS
T-Mobil	D1	GSM-900	Lucent (Philips)	3000	-	GPRS
T-Mobil	D1	GSM-900	Motorola	BTS	-	GPRS
T-Mobil	D1	GSM-900	Nokia	BTS	-	-
T-Mobil	D1	GSM-900	Siemens	-	MSC	-
T-Mobil	PCN Trial	GSM-1800	Alcatel	6	-	-
T-Mobil		C-450	Siemens (with PKI)	1975	16	-
T-Mobile		W-CDMA	Nokia	-	-	-
T-Mobile		W-CDMA	Nortel	-	-	-
T-Mobile		W-CDMA	Siemens	-	-	-
Viag Interkom	E2 Mobilfunk	GSM-1800	Nokia	BTS	-	GPRS
Viag Interkom	E2 Mobilfunk	GSM-1800	Nortel	BTS	MSC	-
Gibraltar						
Gibraltar Telecom	GibTel	GSM-900	Ericsson	BTS	MSC	-
Greece						
Cosmote	Cosmote	GSM-1800	Ericsson	300	-	-
Cosmote	Cosmote	GSM-1800	Nokia	938	6	GPRS
Panafon	Panafon	GSM-900	Ericsson	>1,100	14	GPRS
STET Hellas	TeleSTET	GSM-900	DSC	-	-	-
STET Hellas	TeleSTET	GSM-900	Ericsson	426	4	-
STET Hellas	TeleSTET	GSM-900	Italtel	63	-	-
STET Hellas	TeleSTET	GSM-900	Siemens	>50	-	-
Greenland						
TeleGreenland		GSM-900	Celcore	BTS	MSC	-
TeleGreenland		GSM-900	Siemens	BTS	MSC	-
TeleGreenland		NMT-900	Hans Damm	10	1	-
Guernsey						
Guernsey Telecom		GSM-900	Ericsson	15	1	-
Iceland						
Iceland Telecom	Iceland Telecom	GSM-900	Ericsson	91	1	GPRS
Iceland Telecom	Iceland Telecom	NMT-450	Ericsson	84	1	-
Islandssimi GSM	3G	GSM-1800	Ericsson	-	-	GPRS
TAL	TAL	GSM-900	Nortel	15	1	GPRS
Ireland						
Eircell	Eircell	GSM-900	Ericsson	300+	2	GPRS
Eircell	Eircell	TACS	Ericsson	127	1	-
Esat-Digifone		GSM-900	Nortel	300	MSC	GPRS
Meteor Communications		GSM-9/18	Lucent	-	-	GPRS

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Isle of Man						
Manx Telecom		GSM-900	Ericsson	BTS	MSC	-
Manx Telecom		W-CDMA	NEC	BTS	-	-
Manx Telecom		W-CDMA	Siemens	-	MSC	-
Italy						
Blu		GSM-1800	Nokia	BTS	MSC	GPRS
Blu		GSM-1800	Nortel	BTS	MSC	-
Omnitel Pronto Italia	Omnitel	GSM-900	Lucent	BTS	MSC	-
Omnitel Pronto Italia	Omnitel	GSM-900	Nokia	2,880	MSC	-
Omnitel Pronto Italia	Omnitel	GSM-9/18	Lucent	BTS	MSC	-
Omnitel Pronto Italia	Omnitel	GSM-9/18	Nokia	2,880	MSC	-
Omnitel Pronto Italia	Omnitel	W-CDMA	Nokia	-	-	-
Omnitel Pronto Italia	Omnitel	W-CDMA	Nortel	-	-	-
Telecom Italia Mobile		GSM-900	Ericsson	4,000	12	HSCSD
Telecom Italia Mobile		GSM-900	Italtel	630	7	-
Telecom Italia Mobile		GSM-900	Siemens	-	MSC	GPRS
Telecom Italia Mobile		GSM-9/18	Ericsson	4,000	12	HSCSD
Telecom Italia Mobile		GSM-9/18	Italtel	-	-	-
Telecom Italia Mobile		GSM-9/18	Siemens	-	MSC	-
Telecom Italia Mobile		RTMS	(unknown)	395	19	-
Telecom Italia Mobile		TACS	Ericsson	1800	50	-
Telecom Italia Mobile		W-CDMA	Ericsson	-	-	-
Telecom Italia Mobile		W-CDMA	NEC	-	-	-
Telecom Italia Mobile		W-CDMA	Siemens	-	-	-
Wind		GSM-1800	Ericsson	BTS	MSC	-
Wind		GSM-1800	Siemens	BTS	-	-
Wind		W-CDMA	Alcatel	-	-	-
Wind		W-CDMA	Nokia	-	-	-
Wind		W-CDMA	Siemens	-	-	-
Jersey						
Cellnet		TACS	(unknown)	-	-	-
Jersey Telecom		GSM-900	Alcatel	18	1	-
Liechtenstein						
Viag Europlattform		GSM-1800	Nokia	BTS	MSC	GPRS
Luxembourg						
PTT	LuxGSM	GSM-900	Philips [Withdrawn]	33	-	-
P&T	LuxGSM	GSM-900	Siemens	65	1	-
P&T	LuxGSM	GSM-9/18	Siemens	BTS	MSC	-
P&T		NMT-450	Ericsson	-	0	-
Société Européenne de Communication	TANGO	GSM-9/18	Ericsson	BTS	MSC	HSCSD GPRS
Malta						
MobIsle Communications		GSM-1800	Nortel	BTS	MSC	GPRS
Vodafone Malta		GSM-900	Siemens	53	1	-
Vodafone Malta		TACS	Ericsson	19	1	-
Monaco						
Monacell	Monacell	GSM-900	Alcatel	4	1	-
Netherlands						
Ben Nederland	Ben	GSM-1800	Nokia	BTS	MSC	GPRS
Dutchtone		GSM-1800	Alcatel	BTS	MSC	-
Dutchtone		GSM-1800	Nokia	-	-	GPRS
Dutchtone		GSM-1800	Nortel	BTS	-	-
KPN	ATF-2	NMT-450	Ericsson	-	16	-
KPN	ATF-2	NMT-450	Philips	-	-	-
KPN	ATF-3	NMT-900	Philips	BTS	MSC	-
KPN	ATF-4	GSM-900	Alcatel	-	-	-
KPN	ATF-4	GSM-900	Ericsson	-	MSC	GPRS
KPN	ATF-4	GSM-900	Nokia	BTS	-	-
Libertel	Libertel	GSM-900	Ericsson	1,400	9	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Netherlands						
Telfort		GSM-1800	Ericsson	BTS	MSC	GPRS
Telfort		W-CDMA	Ericsson	-	-	-
Norway						
NetCom	NetCom	GSM-900	Motorola	900	-	-
NetCom	NetCom	GSM-900	Nokia	150	-	GPRS
NetCom	NetCom	GSM-900	Siemens	BTS	MSC	GPRS
NetCom	Trial	GSM-1800	Motorola	7	-	-
NetCom		W-CDMA	Nokia	-	-	-
NetCom		W-CDMA	Siemens	-	-	-
Telenor		W-CDMA	Ericsson	-	-	-
Telenor		W-CDMA	Nokia	BTS	-	-
Telenor Mobil	Telenor Mobil	GSM-900	Ericsson	1000	4	HSCSD
Telenor Mobil	Telenor Mobil	GSM-900	Nokia	BTS	-	HSCSD
Telenor Mobil	Telenor Mobil	GSM-9/18	Nokia	BTS	-	HSCSD GPRS
Telenor Mobil	Trial	GSM-1800	Ericsson	8	MSC	-
Telenor Mobil	Trial	GSM-9/18	Ericsson	BTS	MSC	-
Telenor Mobil		NMT-450	Ericsson	BTS	15	-
Telenor Mobil		NMT-450	Nokia	BTS	-	-
Telenor Mobil		NMT-900	Nokia	BTS	-	-
Portugal						
Oni Way		W-CDMA	Nortel Networks	-	-	-
Oni Way		W-CDMA	Siemens	BTS	-	-
Optimus	Main Road	GSM-9/18	Ericsson	BTS	MSC	-
Optimus	Main Road	GSM-9/18	Motorola	BTS	-	-
Optimus		GSM-9/18	Nokia	-	-	GPRS
Optimus		W-CDMA	Ericsson	-	-	-
Telecel	Telecel	GSM-900	Ericsson	400	>3	GPRS
Telecel	Telecel	GSM-9/18	Ericsson	BTS	MSC	GPRS
Telecel	Telecel	GSM-9/18	Lucent	BTS	-	-
Telecel		W-CDMA	Nortel Networks	-	-	-
Telecel		W-CDMA	Ericsson	-	-	-
TMN	Telemovel	GSM-900	Ericsson	BTS	-	-
TMN	Telemovel	GSM-900	Lucent (Philips)	228	-	-
TMN	Telemovel	GSM-900	Motorola	100(E)	-	-
TMN	Telemovel	GSM-900	Siemens	BTS	2	-
TMN	Telemovel	GSM-9/18	Alcatel	BTS	-	GPRS
TMN	Telemovel	GSM-9/18	Ericsson	BTS	-	-
TMN	Telemovel	GSM-9/18	Lucent (Philips)	228	-	-
TMN	Telemovel	GSM-9/18	Motorola	BTS	-	-
TMN	Telemovel	GSM-9/18	Siemens	BTS	2	-
TMN	Telemovel	W-CDMA	Alcatel	-	-	-
TMN	Telemovel	W-CDMA	Ericsson	-	-	-
TMN	Telemovel	W-CDMA	Siemens	-	-	-
TMN		C-450	Siemens	90	1	-
Spain						
Airtel	Airtel	GSM-900	Ericsson	300+	MSC	-
Airtel	Airtel	GSM-900	Nortel	-	MSC	-
Airtel	Airtel	GSM-900	Siemens	120	2	-
Airtel	Airtel	GSM-9/18	Ericsson	300+	MSC	-
Airtel	Airtel	GSM-9/18	Nortel	-	MSC	-
Airtel	Airtel	GSM-9/18	Siemens	120	2	-
Airtel	Airtel	W-CDMA	Nortel	-	-	-
Retevisión Móvil	Amena	GSM-1800	Ericsson	BTS	MSC	-
Retevisión Móvil	Amena	GSM-1800	Italtel	BTS	MSC	-
Retevisión Móvil	Amena	GSM-1800	Nokia	BTS	MSC	-
Retevisión Móvil	Amena	GSM-1800	Siemens	BTS	MSC	GPRS
Retevisión Movil	Amena	W-CDMA	Ericsson	BTS	-	-

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
Spain						
Retevisión Movil	Amena	W-CDMA	Siemens	3000	-	-
Telefónica	MoviLine	TACS	Motorola	1,330	-	-
Telefónica	MoviStar	GSM-900	Ericsson	BTS	MSC	-
Telefónica	MoviStar	GSM-900	Motorola	1,200	-	-
Telefónica	MoviStar	GSM-900	Nokia	430	-	-
Telefónica	MoviStar	GSM-9/18	Ericsson	BTS	MSC	-
Telefónica	MoviStar	GSM-9/18	Motorola	1,200	-	-
Telefónica	MoviStar	GSM-9/18	Nokia	430	-	GPRS
Telefónica	TMA	NMT-450	Ericsson	-	2	-
Telefonica		W-CDMA	Ericsson	-	-	-
Telefonica		W-CDMA	Motorola	-	-	-
Telefonica		W-CDMA	Nokia	BTS	-	-
Xfera		W-CDMA	Ericsson	BTS	-	-
Xfera		W-CDMA	Nortel	BTS	-	-
Sweden						
Comvik	Comviq GSM	GSM-900	Motorola	BTS	-	-
Comvik	Comviq GSM	GSM-900	Siemens	-	MSC	-
Comvik	Comviq GSM	GSM-9/18	Motorola	BTS	-	-
Comvik	Comviq GSM	GSM-9/18	Siemens	-	MSC	-
Comvik		Comvik	(unknown)	-	-	-
Europolitan	Europolitan	GSM-900	Ericsson	BTS	-	-
Europolitan	Europolitan	GSM-900	Nokia	BTS	MSC	GPRS
Europolitan		GSM-1800	Ericsson	BTS	-	-
Europolitan		GSM-1800	Nokia	BTS	-	HSCSD
Telia Mobitel	Telia Mobitel GSM	GSM-900	Ericsson	BTS	MSC	HSCSD
Telia Mobitel	Telia Mobitel GSM	GSM-900	Nokia	BTS	-	-
Telia Mobitel		GSM-9/18	Ericsson	BTS	MSC	GPRS
Telia Mobitel		GSM-9/18	Nokia	BTS	-	-
Telia Mobitel		NMT-450	Ericsson	BTS	MSC	-
Telia Mobitel		NMT-900	Ericsson	BTS	MSC	-
Telia Mobitel		NMT-900	Nokia	B	-	-
Switzerland						
diAx		GSM-9/18	Nokia	300	MSC	GPRS
Orange		GSM-1800	Nokia	BTS	MSC	GPRS
Swisscom	Natel-C	NMT-900	Ericsson	875	12	-
Swisscom	Natel-C	NMT-900	Philips	-	-	-
Swisscom	Natel-City	GSM-1800	DSC	-	MSC	-
Swisscom	Natel-City	GSM-1800	Ericsson	-	-	-
Swisscom	Natel-City	GSM-1800	Nokia	BTS	-	-
Swisscom	Natel-D	GSM-900	DSC	-	MSC	-
Swisscom	Natel-D	GSM-900	Ericsson	320	4	-
Swisscom	Natel-D	GSM-900	Lucent (Philips)	355	-	-
Swisscom		GSM-9/18	DSC	-	MSC	-
Swisscom		GSM-9/18	Ericsson	-	-	GPRS
Swisscom		GSM-9/18	Lucent (Philips)	BTS	-	-
Swisscom		GSM-9/18	Nokia	BTS	-	-
Swisscom		W-CDMA	Ericsson	-	-	-
Turkey						
Telsim	Telsim	GSM-900	Motorola	1,320	-	GPRS
Telsim	Telsim	GSM-900	Nokia	BTS	8	-
Telsim		GSM-900	Alcatel	30	-	-
Telsim		GSM-900	Siemens	130	4	-
Telsim		W-CDMA	Motorola	-	-	-
Turk Telecom		NMT-450	Nokia	620	4	-
Turk Telekom		GSM-1800	Ericsson	BTS	-	-
Turk Telekom		GSM-1800	Siemens	-	-	-
Turkcell		GSM-900	Ericsson	7000	1700	GPRS

Operator	Network	System	Supplier	B. Stations	MSC	Mobile Data
UK						
BT Cellnet	BT Cellnet	GSM-1800	Nokia	BTS	-	-
BT Cellnet	BT Cellnet	GSM-900	Ericsson	4,000	-	-
BT Cellnet	BT Cellnet	GSM-900	Motorola	-	-	GPRS
BT Cellnet	BT Cellnet	GSM-900	Nokia	BTS	-	-
BT Cellnet	BT Cellnet	TACS	Motorola	-	-	-
BT Cellnet	[withdrawn]	GSM-900	Siemens [Withdrawn]	-	MSC	-
BT Cellnet		GSM-900	Ericsson	-	-	-
BT Cellnet		W-CDMA	Nortel	-	-	-
Hutchison 3G		W-CDMA	NEC	-	-	-
Hutchison 3G		W-CDMA	Nokia	-	-	-
One-2-One		GSM-1800	Ericsson	2,776	MSC	GPRS
One-2-One		GSM-1800	Nortel	-	-	GPRS
One 2 One		W-CDMA	Nokia	-	-	-
One 2 One		W-CDMA	Nortel	-	-	-
One 2 One		W-CDMA	Siemens	-	-	-
Orange	Orange	GSM-1800	Nokia	5800	MSC	HSCSD
Orange		GSM-1800	Ericsson	BTS	MSC	GPRS
Orange/France Telecom		W-CDMA	Alcatel	-	-	-
Orange/France Telecom		W-CDMA	Ericsson	-	-	-
Orange/France Telecom		W-CDMA	Nokia	BTS	MSC	-
Vodafone	Mobile VPN	GSM-1800	Ericsson	BTS	-	-
Vodafone	Vodafone	GSM-900	Ericsson	BTS	MSC	GPRS
Vodafone	Vodafone	GSM-900	Nokia	5,100	MSC	-
Vodafone	Vodafone	GSM-900	Orbitel	-	-	-
Vodafone	Vodafone	TACS	Ericsson	-	35	-
Vodafone	Vodafone	TACS	Motorola	-	-	-
Vodafone	Vodafone	TACS	Orbitel	-	-	-
Vodafone	[Newbury Trial]	CDMA-800	Qualcomm	BTS	MSC	-
Vodafone		W-CDMA	Ericsson	-	-	-
Vodafone			C&W	-	-	-

Cellular network owners and investors - Western Europe

Country	Network	Owner/Investor	Share	Notes
Austria				
	Connect-Austria GmbH (GSM-1800)			
		E.ON	30.00 %	Provisional - Sale
		RHI Telecom GmbH	20.10 %	Provisional
		Telenor Invest A/S	17.45 %	Provisional
		Orange Overseas Holdings Ltd	17.45 %	Provisional
		Tele Danmark	15.00 %	Provisional
	max.mobil Telekommunikation Service GmbH (GSM)			
		DeTeMobil (Deutsche Telekom MobilNet GmbH	100.00 %	
	Mobilkom (GSM-9/18)			
		Telekom Austria	75.00 %	
		STET Mobile Holding (SMH)	25.00 %	
	Mobilkom (TACS)			
		Telekom Austria	75.00 %	
		STET Mobile Holding (SMH)	25.00 %	
	tele.ring (GSM-1800)			
		Mannesmann Eurokom	53.80 %	
		Local investors	46.20 %	
Belgium				
	Belgacom Mobile (Proximus) (GSM-9/18)			
		Belgacom	75.00 %	
		Vodafone Group	25.00 %	
	KPN Orange Belgium NV (GSM-1800)			
		KPN Mobile NV	50.00 %	Provisional
		Orange Overseas Holdings Ltd	50.00 %	Provisional - Sale
	Mobistar (GSM)			
		FTPB Belgium	50.71 %	
		Publicly traded	19.79 %	
		Financial Consortium	18.82 %	
		Telindus Group	6.61 %	
		Cobema	4.74 %	
		Bruficom	4.07 %	
		CIPPAR	3.98 %	
		GIMV	3.98 %	
		Wallonie Communications	3.98 %	
		Bruficom	3.90 %	
		Telindus NV	3.49 %	
		Telindus GSM	3.20 %	
		KBC Verzekeringen	1.84 %	
		Regio	1.56 %	
		Gevaert	1.53 %	
		KBC Bank	0.80 %	
	Proximus (GSM-9/18)			
		SBC Communications	13.12 %	
Denmark				
	Mobilix A/S (GSM-1800)			
		FTMI Denmark	54.00 %	
		Banestyrelsen	14.00 %	
		PAI (Paribas Affaires Industrielles)	9.00 %	
		GE Capital Structured Finance Group (SFG)	9.00 %	
		Part'Com (Groupe Caisse des Dépôts)	6.00 %	
		Capital Communications CDPQ	5.00 %	
		Mediatel Capital	3.00 %	
	Sonofon (GSM)			
		Telenor	53.50 %	
		BellSouth International	46.50 %	
	Tele Danmark Mobil (GSM-1800)			
		Tele Danmark	100.00 %	

Country	Network	Owner/Investor	Share	Notes
Denmark				
	Tele Danmark Mobil (GSM)			
		Tele Danmark	100.00 %	
	Tele Danmark Mobil (NMT-450)			
		Tele Danmark	100.00 %	
	Tele Danmark Mobil (NMT-900)			
		Tele Danmark	100.00 %	
	Telia Denmark (GSM-1800)			
		Telia	100.00 %	
Finland				
	Alands Mobile (GSM-1800)			
		Mariehamns Telefon Ab	50.00 %	
		Alands Telefonandelslag	50.00 %	
	Finnish 2G (GSM)			
		Finnet Group	100.00 %	
	Kolmegee Oy (Finnish 3G) (UMTS)			
		Finnet Group	80.00 %	
		Tele2	20.00 %	
	Radiolinja (GSM-9/18)			
		Elisa Communications	99.00 %	
		Minority shareholders	1.00 %	
	Sonera Corporation (GSM-9/18)			
		Government of Finland	54.50 %	
		Nominee-registered shares	28.90 %	
		Other shareholders	8.70 %	
		Institutional investors	7.90 %	
	Sonera Corporation (NMT-450)			
		Government of Finland	54.50 %	
		Nominee-registered shares	28.90 %	
		Other shareholders	8.70 %	
		Institutional investors	7.90 %	
	Sonera Corporation (NMT-900)			
		Government of Finland	54.50 %	
		Nominee-registered shares	28.90 %	
		Other shareholders	8.70 %	
		Institutional investors	7.90 %	
	Sonera Corporation (UMTS)			
		Government of Finland	54.50 %	
		Nominee-registered shares	28.90 %	
		Other shareholders	8.70 %	
		Institutional investors	7.90 %	
	Telia Finland (Telivo) (GSM-1800)			
		Telia	100.00 %	
France				
	Bouygues Télécom (GSM-1800)			
		Bouygues Decaux Telecom	55.00 %	
		Cable & Wireless plc	20.00 %	
		Veba Telecom	17.50 %	
		Banque Nationale de Paris (BNP)	3.50 %	
		Paribas	3.00 %	
		Bouygues	1.00 %	
	FT Mobiles 1800 (GSM-1800)			
		Cogecom	99.70 %	
	Itineris (GSM-9/18)			
		France Telecom SA	100.00 %	
	SFR (GSM)			
		Cegetel	80.00 %	
		Vodafone Group	20.00 %	

Country	Network	Owner/Investor	Share	Notes
Germany				
	DeTeMobil (Deutsche Telekom MobilNet GmbH) (GSM)			
		Deutsche Telekom AG	100.00 %	
	E-Plus (GSM-1800)			
		KPN Mobile NV	77.50 %	
		BellSouth Enterprise	22.50 %	
	Group 3G (UMTS)			
		Telefónica	57.20 %	
		Sonera	42.80 %	
	Mannesmann Mobilfunk (D2) (GSM)			
		Vodafone Group	99.10 %	
	MobilCom Multimedia (UMTS)			
		MobilCom	100.00 %	
	Viag Interkom (GSM-1800)			
		BT (British Telecommunications plc)	100.00 %	
Gibraltar				
	GibTel (GSM)			
		BT (British Telecommunications plc)	50.00 %	
Greece				
	Cosmote (GSM-1800)			
		OTE	58.98 %	
		Telenor	18.00 %	
		Publicly traded	15.75 %	
		WR Com Enterprises Ltd	7.27 %	
	Panafon (GSM)			
		Vodafone Group	55.00 %	
		Publicly traded	32.00 %	
		Intracom	10.00 %	
		France Telecom SA	3.00 %	
	STET Hellas (GSM)			
		STET Mobile Holding (SMH)	58.10 %	
		Bell Atlantic	20.00 %	
		Publicly traded	16.70 %	
		InterAmerican	5.20 %	
Iceland				
	Icelandic PTT (GSM)			
		Government of Iceland	100.00 %	
	Icelandic PTT (NMT-450)			
		Government of Iceland	100.00 %	
	Islandssimi (GSM)			
		Small investors	72.00 %	
		Burdaras	14.00 %	
		3P Fjarhus	14.00 %	
	Lina.net (GSM-1800)			
		Reykjavik Energy	60.00 %	
		Skerr	27.00 %	
		Islandssimi	8.00 %	
		TAL hf	5.00 %	
	TAL hf (GSM)			
		Western Wireless International	49.00 %	
		Icelandic Broadcasting Company	34.67 %	
		Walter Group	16.33 %	
Ireland				
	Eircell (GSM)			
		Eircom (Telecom Eireann)	100.00 %	Provisional - Sale
	Eircell (TACS)			
		Eircom (Telecom Eireann)	100.00 %	Provisional - Sale
	Esat-Digifone (GSM)			
		Esat Telecom Group	100.00 %	

Country	Network	Owner/Investor	Share	Notes
Ireland				
	Meteor Mobile Communications Ltd (GSM-1800)			
		Western Wireless International	60.00 %	
		RF Communications	30.00 %	
		The Walter Group	10.00 %	
Italy				
	Andala (UMTS)			
		Hutchison Whampoa (HWL)	78.30 %	
		CIR Holding	12.90 %	
		San Paolo - IMI Bank	5.00 %	
		Franco Bernabe	2.00 %	
		HDP - Gemina	1.50 %	
		Tiscali	0.30 %	
	Blutel (GSM)			
		Autostrade SpA	35.00 %	
		BT (British Telecommunications plc)	21.00 %	
		Mediaset SpA	10.00 %	
		Edizione Holding (Benetton family)	10.00 %	
		Distacom	10.00 %	
		ENI (Italgas) SpA	7.00 %	
		Banca Nazionale de Lavoro	7.00 %	
	IPSE 2000 (UMTS)			
		Telefónica	45.70 %	
		Sonera Corporation	12.55 %	
		Atlanet	12.00 %	
		Banca di Roma	10.00 %	
		Xera	5.00 %	
		Goldenegg	4.80 %	
		Others	4.45 %	
		Edison	3.00 %	
		Falck	2.00 %	
		e.Planet	0.50 %	
	Omnitel Pronto Italia (GSM-9/18)			
		Omnitel Sistemi Radiocellulari Italiani	70.00 %	
		Pronto Italia	30.00 %	
	Telecom Italia Mobile SpA (TIM) (GSM-9/18)			
		Tecnost	60.15 %	
		Traded shares/other institutional etc	29.95 %	
		Banca d'Italia	1.77 %	
		Société Générale	1.29 %	
		Bankers Trust	1.00 %	
		Fonditalia	0.92 %	
		Europacific Growth Fund	0.77 %	
		Arca	0.71 %	
		Finanza & Futuro Fondi Sprind	0.66 %	
		Nomura International	0.65 %	
		Fidelity International	0.62 %	
		Merrill Lynch & Co	0.60 %	
		National Bank of Abu Dhabi	0.46 %	
		Adia European Investment Authority	0.45 %	

Country	Network	Owner/Investor	Share	Notes
Italy				
	Telecom Italia Mobile SpA (TIM) (TACS)			
		Tecnost	60.15 %	
		Traded shares/other institutional etc	29.95 %	
		Banca d'Italia	1.77 %	
		Société Générale	1.29 %	
		Bankers Trust	1.00 %	
		Fonditalia	0.92 %	
		Europacific Growth Fund	0.77 %	
		Arca	0.71 %	
		Finanza & Futuro Fondi Sprind	0.66 %	
		Nomura International	0.65 %	
		Fidelity International	0.62 %	
		Merrill Lynch & Co	0.60 %	
		National Bank of Abu Dhabi	0.46 %	
		Adia European Investment Authority	0.45 %	
	Wind (GSM-1800)			
		Enel	73.40 %	Provisional
		France Telecom SA	26.60 %	Provisional
Luxembourg				
	Tango (GSM-9/18)			
		Société Européenne de Communication (SEC)	100.00 %	
Malta				
	Mobisle Communications (GSM-1800)			
		Maltacom	100.00 %	
	Vodafone Malta (GSM)			
		Vodafone Group	80.00 %	
		Maltacom	20.00 %	
	Vodafone Malta (TACS)			
		Vodafone Group	80.00 %	
		Maltacom	20.00 %	
Netherlands				
	Ben Nederland (GSM-1800)			
		Belgacom	70.60 %	Provisional - Sale
		Deutsche Telekom	49.90 %	Provisional - Purchase
		Tele Danmark	29.40 %	Provisional - Sale
	Dutchtone (GSM-1800)			
		France Telecom SA	80.00 %	
		ABN Amro	10.00 %	
		Rabobank	10.00 %	
	KPN Mobile The Netherlands BV (GSM)			
		KPN Mobile NV	100.00 %	
	Libertel (GSM)			
		Vodafone Group	70.00 %	
		Publicly traded	22.50 %	
		ING Bank	7.50 %	
	Telfort (GSM-1800)			
		BT (British Telecommunications plc)	100.00 %	
Norway				
	NetCom ASA (GSM-9/18)			
		Telia	99.00 %	
		Minority holders	1.00 %	
	Telenor Mobil AS (GSM-9/18)			
		Telenor	100.00 %	
	Telenor Mobil AS (NMT-450)			
		Telenor	100.00 %	
	Telenor Mobil AS (NMT-900)			
		Telenor	100.00 %	
	Telenor Mobil AS (UMTS)			
		Telenor	100.00 %	

Country	Network	Owner/Investor	Share	Notes
Portugal				
	Oni Way (UMTS)			
		Oni	55.00 %	
		Telenor	20.00 %	
		Iberdrola	8.00 %	
		Brisatel	4.00 %	
		Media Capital	4.00 %	
		Impresa	3.00 %	
		Grupo Jeronimo Martins	3.00 %	
		Grapes	2.00 %	
		EFACEC	1.00 %	
	Optimus (GSM-9/18)			
		Sonae.com	45.00 %	
		EDP	25.00 %	
		France Telecom SA	20.00 %	
		Maxitel	5.00 %	
		IPE	5.00 %	
	Optimus (UMTS)			
		Sonae.com	45.00 %	
		EDP	25.00 %	
		France Telecom SA	20.00 %	
		Maxitel	5.00 %	
		IPE	5.00 %	
	Telecel (GSM-9/18)			
		Vodafone Group	50.90 %	
		Publicly Traded	49.10 %	
	TMN (GSM-9/18)			
		Portugal Telecom	100.00 %	
Spain				
	Airtel (GSM-9/18)			
		Vodafone Group	73.00 %	
		BT (British Telecommunications plc)	18.00 %	
		Acciona (Cubiertas)	6.00 %	
		Torreal	3.00 %	
	Airtel (UMTS)			
		Vodafone Group	73.00 %	
		BT (British Telecommunications plc)	18.00 %	
		Acciona (Cubiertas)	6.00 %	
		Torreal	3.00 %	
	Retevisión Móvil (GSM-1800)			
		Auna	40.10 %	
		STET Mobile Holding (SMH)	23.30 %	
		Unión Fenosa	11.55 %	
		Endesa	11.55 %	
		Caixa de Ahorros de Mediterraneo	2.10 %	
		Caixa de Ahorros de Navarra	2.10 %	
		Caja de Cataluña	2.10 %	
		Caixa de Ahorros Vigo, Ourense y Pontevedra	2.10 %	
		Kutuxa	2.00 %	
		Euskaltel	2.00 %	
		Unicaja	0.60 %	
		Gessinest	0.50 %	

Country	Network	Owner/Investor	Share	Notes
Spain				
	Retevisión Móvil (UMTS)			
		Auna	40.10 %	
		STET Mobile Holding (SMH)	23.30 %	
		Unión Fenosa	11.55 %	
		Endesa	11.55 %	
		Caixa de Ahorros de Mediterraneo	2.10 %	
		Caixa de Ahorros de Navarra	2.10 %	
		Caja de Cataluña	2.10 %	
		Caixa de Ahorros Vigo, Ourense y Pontevedra	2.10 %	
		Kutuxa	2.00 %	
		Euskaltel	2.00 %	
		Unicaja	0.60 %	
		Gessinest	0.50 %	
	Telefonica Moviles (GSM-9/18)			
		Telefónica	100.00 %	
	Telefonica Moviles (TACS)			
		Telefónica	100.00 %	
	Telefonica Moviles (UMTS)			
		Telefónica	100.00 %	
	Xfera (UMTS)			
		Vivendi	27.50 %	
		Actividades de Construccion y Servicios	20.00 %	
		Mercapital	17.60 %	
		Sonera Corporation	15.00 %	
		Acesa	7.90 %	
		Ahorro Corporacion Financiera	5.00 %	
Sweden				
	Comviq (GSM-9/18)			
		NetCom AB	100.00 %	
	Europolitan (GSM)			
		Europolitan Holdings	100.00 %	
	Telia Mobitel (GSM-9/18)			
		Telia	100.00 %	
	Telia Mobitel (NMT-450)			
		Telia	100.00 %	
	Telia Mobitel (NMT-900)			
		Telia	100.00 %	
Switzerland				
	Orange Communications SA (GSM-1800)			
		Orange Overseas Holdings Ltd	42.50 %	
		Viag Telecom	42.50 %	Provisional - Sale
		Banque Cantonale Vaudoise	10.00 %	
		Swissphone	5.00 %	
	Sunrise/diAx (GSM-9/18)			
		Tele Danmark	78.50 %	
		diAx Holding	16.70 %	
		SBB (Swiss Federal Railway)	2.60 %	
		UBS	2.20 %	
	Swisscom Mobile (GSM-9/18)			
		Swisscom	100.00 %	Provisional - Sale
		Vodafone Group	25.00 %	Provisional - Purchase
	Swisscom Mobile (NMT-900)			
		Swisscom	100.00 %	Provisional - Sale
		Vodafone Group	25.00 %	Provisional - Purchase

Country	Network	Owner/Investor	Share	Notes
Turkey				
	IS TIM Telekomunikasyon Hizmetleri A.S. (GSM-1800)			
		TIM International BV	29.00 %	
		Trakya Yatirim Holding	25.00 %	
		Telecom Italia SpA (TI)	20.00 %	
		Turkiye IS Bankasi	14.00 %	
		Efes Holding	6.25 %	
		Turkiye Sise ve Cam Fab	5.00 %	
		Anadolu Anonim Turk Sigorta	0.50 %	
		Anadolu Hayat Sigorta	0.25 %	
	Telsim (GSM)			
		Rumeli Telefon Sistemleri	73.63 %	
		Rumeli Holding	21.99 %	
		Cukurova Elektrik	2.62 %	
		Pamukova	1.01 %	
		Detecon Deutsch Telepost Consulting	0.43 %	
		Standart Telekomunikasyon Bilgisayar Hizmetle	0.32 %	
	Turkcell Iletisim Hizmetleri AS (GSM)			
		Turkcell Holding AS	51.00 %	
		Çukurova Group Companies	16.10 %	
		Sonera Holding BV	12.70 %	
		Publicly traded	10.50 %	
		Murat Vargi Telekomunikasyon Holding	3.30 %	
		Murat Vargi Telekomunikasyon Investing	3.10 %	
		Bilka	2.20 %	
		Acteon Ltd	1.10 %	
UK				
	BT Cellnet (GSM-1800)			
		BT (British Telecommunications plc)	100.00 %	
	BT Cellnet (GSM)			
		BT (British Telecommunications plc)	100.00 %	
	BT Cellnet (TACS)			
		BT (British Telecommunications plc)	100.00 %	
	BT3G (UMTS)			
		BT (British Telecommunications plc)	100.00 %	
	Hutchison 3G UK Holdings Ltd (UMTS)			
		Hutchison Whampoa Ltd (HWL)	58.50 %	
		NTT DoCoMo	20.00 %	
		KPN Mobile NV	15.00 %	
		Telesystem International Wireless Inc	6.50 %	Provisional - Purchase
	One 2 One (GSM-1800)			
		Deutsche Telekom AG	100.00 %	
	One 2 One (UMTS)			
		Deutsche Telekom AG	100.00 %	
	Orange Personal Communications Services Ltd (GSM-1800)			
		Hutchison Telecommunications (UK) Ltd	100.00 %	Provisional
	Orange Personal Communications Services Ltd (UMTS)			
		Hutchison Telecommunications (UK) Ltd	100.00 %	Provisional
	TIW UMTS UK Ltd (First Theme) (UMTS)			
		Hutchison 3G UK Holdings Ltd	100.00 %	
	Vodafone (GSM-1800)			
		Vodafone Group	100.00 %	
	Vodafone (GSM)			
		Vodafone Group	100.00 %	
	Vodafone (TACS)			
		Vodafone Group	100.00 %	
	Vodafone (UMTS)			
		Vodafone Group	100.00 %	

Cellular network tariffs and charges - Western Europe

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Andorra								
Mobiland - Mobiland								
Mobiland GSM	0.00	20.12	0.22	0.15				Apr 1996
Austria								
Connect Austria - One								
One 99	23.46	5.81	0.29	0.12				Mar 1999
ONE 99	25.60	5.08	0.15	0.15				Sep 2000
ONE Classic	25.60	12.82	0.10	0.10				Sep 2000
ONE Standard	25.60	20.47	0.05	0.05				Jul 2000
max.mobil - max.mobil								
company.max	22.78	15.34	0.05	0.05			30 mins	Jun 2000
freizeit.max	22.78	12.77	0.15	0.10				Jun 2000
mini.max	22.78	5.08	0.30	0.15				Jun 2000
profi.max	22.78	20.47	0.05	0.05			30 mins	Jun 2000
Mobilkom Austria - A1-Mobilkom								
A1-Business	27.70	20.01	0.05	0.05				Jun 2000
A1-Company	27.70	15.39	0.05	0.05				Jun 2000
A1-Fun	27.70	17.73	0.20	0.10				Jun 2000
A1-Global	27.70	25.24	0.05	0.05				Jun 2000
A1-Start	27.70	9.18	0.30	0.15				Jun 2000
Mobilkom Austria - Mobiltelfonnetz-D (Netz-D)								
D-Company	23.09	13.85	0.05	0.05				Jun 2000
D-Freizeit	23.09	11.24	0.20	0.09				Jun 2000
D-Geschaeft	23.09	14.88	0.05	0.05				Jun 2000
D-Schnupper	26.42	8.75	0.35	0.17				Jun 2000
tele.ring - tele.ring								
clever 60	17.96	7.64	0.20	0.10			60 mins	Oct 2000
clever 150	17.96	15.34	0.05	0.05			150 mins	Oct 2000
mobil 150	17.96	20.47	0.05	0.05			150 mins	Sep 2000
mobil 20	17.96	5.08	0.25	0.15			20 mins	Sep 2000
mobil 60	17.96	10.21	0.20	0.10			60 mins	Sep 2000
Belgium								
Belgacom Mobile - Proximus								
ProxiFun	26.04	9.11	0.35	0.10				Jun 2000
ProxiFun ProxiFriends	26.04	9.98	0.35	0.10				Jun 2000
ProxiFun ProxiFriends 60	26.04	12.24	0.35	0.10			60 mins	Jun 2000
ProxiFun Weekend	26.04	9.98	0.35	0.10		0.05		Jun 2000
ProxiFun Weekend 60	26.04	12.24	0.35	0.10		0.05	60 mins	Jun 2000
ProxiFun, Anytime 30	26.04	11.72	0.35	0.10			30 mins	Jun 2000
ProxiFun, Anytime 60	26.04	14.32	0.35	0.10			60 mins	Jun 2000
ProxiPro	34.72	16.49	0.18	0.10				Jun 2000
ProxiPro Anytime 60	34.72	21.70	0.18	0.10			60 mins	Jun 2000
ProxiPro Group	34.72	16.49	0.18	0.10				Jun 2000
ProxiPro Group Anytime 60	34.72	24.30	0.18	0.10			60 mins	Jun 2000
ProxiPro Group ProxiFriends	34.72	19.62	0.18	0.10				Jun 2000
ProxiPro Group Weekend	34.72	19.62	0.18	0.10		0.05	60 mins	Jun 2000
ProxiPro ProxiFriends	54.69	26.55	0.35	0.21				Sep 1997
ProxiPro ProxiFriends	34.72	17.36	0.18	0.10				Jun 2000
ProxiPro ProxiFriends 60	34.72	19.62	0.18	0.10			60 mins	Jun 2000
ProxiPro Weekend	34.72	17.36	0.18	0.10		0.05		Jun 2000
ProxiPro Weekend 60	34.72	19.62	0.18	0.10		0.05	60 mins	Jun 2000
ProxiTime	26.04	10.42	0.26	0.26			40 mins	Oct 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Belgium								
Mobistar - Mobistar								
Optimum Contact	0.00	8.68	0.26	0.09				Jun 2000
Optimum Contact (40min)	0.00	11.46	0.26	0.09			40 mins	Jun 2000
Optimum For Me (2h)	0.00	17.01	0.26	0.09			120 mins	Jun 2000
Optimum For Me (4h)	0.00	25.34	0.26	0.09			240 mins	Jun 2000
Optimum For Me (6h)	0.00	33.68	0.26	0.09			360 mins	Jun 2000
Optimum For Me (8h)	0.00	42.01	0.26	0.09			480 mins	Jun 2000
Optimum Pro	0.00	34.45	0.26	0.09				Jun 2000
Optimum Together (2h)	0.00	25.69	0.26	0.09			120 mins	Jun 2000
Optimum Together (4h)	0.00	34.02	0.26	0.09			240 mins	Jun 2000
Optimum Together (6h)	0.00	42.36	0.26	0.09			360 mins	Jun 2000
Optimum Together (8h)	0.00	50.69	0.26	0.09			480 mins	Jun 2000
Pro	47.70	21.55	0.29	0.17				Aug 1996
Orange - Orange								
Business Talk	0.00	51.92	0.15	0.15				Apr 2000
My Talk 1	0.00	8.68	0.35	0.09			US$ 8.68	Apr 2000
My Talk 2	0.00	17.36	0.28	0.10			US$ 17.36	Apr 2000
Cyprus								
CYTA PTT - CYTA GSM								
CYTA GSM	31.88	12.75	0.10	0.05				Dec 1996
CYTA PTT - CYTA NMT-900								
CYTA NMT	42.16	21.08	0.10	0.07				Jan 1997
Denmark								
Dansk Mobil Telefon - Sonofon								
Fritid	12.90	10.42	0.52	0.09				Jan 2000
Standard	12.90	10.42	0.25	0.12				Jan 2000
Variant	0.00	3.26						Feb 2002
Mobilix - Mobilix								
Modus 1	0.00	16.28	0.23	0.18			60 mins	Mar 2000
Modus 2	0.00	24.10	0.20	0.16			120 mins	Mar 2000
Modus 3	0.00	31.92	0.16				180 mins	Mar 2000
Modus 5	0.00	46.90	0.16				300 mins	Mar 2000
Modus Intro	0.00	10.42	0.25	0.20			30 mins	Mar 2000
Tele Danmark Mobil - TDK-GSM								
Mobil15	0.00	6.38	0.46	0.20			15 mins	May 2000
Mobil45	0.00	12.90	0.39	0.16			45 mins	May 2000
MobilData	12.90	10.42	0.25	0.12				Mar 2000
MobilErhverv	12.90	10.86	0.25	0.12				Mar 2000
MobilFax	12.90	10.42	0.25	0.12				Mar 2000
MobilFritid Plus	0.00	10.77	0.52	0.09				Dec 1998
MobilPrivat Plus	12.90	10.86	0.25	0.12				Mar 2000
MobilTotal	12.90	11.94	0.08	0.04				Dec 1998
Tele Danmark Mobil - Tele Danmark Mobil NMT 450								
MobilErhverv	12.90	10.86	0.21	0.10				Mar 2000
MobilFritid	12.90	5.43	0.52	0.09				Mar 2000
Tele Danmark Mobil - Tele Danmark Mobil NMT 900								
MobilClassic	12.90	9.77	0.20	0.07				Mar 2000
Telia - Telia								
City	0.00	10.42	0.10	0.10				Jan 2000
Club	0.00	16.28	0.07	0.12			350 mins	Jan 2000
Faroes								
PTT/Faroese Tel Company - NMT-900								
PTT NMT	96.81	11.47	0.52	0.52				Jun 1992
PTT/Faroese Tel Company - NMT 450								
PTT NMT	96.81	11.47	0.52	0.52				Jan 1989

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Finland								
Alands Mobile - Alands Mobile								
Tandem	0.00	4.73	0.32	0.12		0.10		
Tandem Pro	0.00	7.99	0.22	0.16		0.10		
Finnet Group - Cityphone								
HTC DCS-1800	0.00	0.00	0.07	0.07				May 1997
Radiolinja - Radiolinja GSM								
Freetime	7.65	3.10	0.40	0.12		0.10		May 2000
Käyttöliitymä	9.78	7.65	0.30	0.16		0.10		Jan 2000
Osakeliittymä/Shareholder	7.65	9.78	0.27	0.14		0.08		Jan 2000
Perusliitymä/Basic	7.65	4.89	0.49	0.14		0.10		Jan 2000
Tandem	7.65	4.73	0.32	0.12		0.10		May 2000
Tandem Pro	9.75	7.65	0.22	0.16		0.16		Jan 2000
Sonera - Sonera GSM								
Business	7.96	9.95	0.16	0.16				Sep 2000
Business Duo	7.96	9.95	0.20	0.16				Sep 2000
Classic	7.96	3.26	0.31	0.16				Sep 2000
Privat	7.96	16.30	0.39	0.13				Sep 2000
Privat Duo	7.96	19.57	0.25	0.13				Sep 2000
Sonera - Sonera NMT 450								
Business	8.08	10.10	0.33	0.16				May 1997
Business Home Call	16.16	10.10	0.33	0.16				May 1997
Privat	20.20	3.31	0.49	0.13				May 1997
Privat Family	20.20	18.21	0.46	0.11				May 1997
Privat Family Home Call	28.28	18.21	0.46	0.11				May 1997
Privat Home Call	28.28	3.31	0.49	0.13				May 1997
Sonera - Sonera NMT 900								
Business	8.08	10.10	0.29	0.16				May 1997
Business Home Call	16.16	10.10	0.29	0.16				May 1997
Privat	20.20	3.31	0.49	0.13				May 1997
Privat Family	20.20	18.21	0.46	0.11				May 1997
Privat Family Home Call	28.28	18.21	0.46	0.11				May 1997
Privat Home Call	28.28	3.31	0.49	0.13				May 1997
Telia Finland - Telia								
Telia City Basic	0.00	7.99	0.08	0.08				Jun 1999
Telia City Slim	0.00	3.10	0.08	0.08				Jun 1999
Telia Dual	4.73	4.73	0.16	0.16				Dec 1999
France								
Bouygues Telecom - Bouygues								
Ultymo 10H	0.00	57.84	0.10	0.10			600 mins	Jun 2000
Ultymo 2H	0.00	18.74	0.15	0.15			120 mins	Jun 2000
Ultymo 4H	0.00	25.70	0.11	0.11			240 mins	Jun 2000
Ultymo 6H	0.00	36.41	0.10	0.10			360 mins	Jun 2000
Ultymo Pro 10H	0.00	64.26	0.11	0.11			600 mins	Jun 2000
Ultymo Pro 15H	0.00	87.28	0.07	0.07			900 mins	Jun 2000
Ultymo Pro 2H	0.00	21.31	0.18	0.18			120 mins	Jun 2000
Ultymo Pro 4H	0.00	29.45	0.11	0.11			240 mins	Jun 2000
Ultymo Pro 6H	0.00	40.16	0.11	0.11			360 mins	Jun 2000
France Telecom Mobiles - Itineris								
Compte Mobile OLA	0.00	5.25	0.21	0.21				Jul 2000
Déclic	45.20	10.60	0.51	0.13				Sep 1997
itineris 10H	0.00	54.08	0.13	0.13			600 mins	Jul 2000
itineris 15H	0.00	91.57	0.11	0.11			900 mins	Jul 2000
itineris 2H	0.00	21.96	0.21	0.21			120 mins	Jul 2000
itineris 3H	0.00	27.31	0.21	0.21			180 mins	Jul 2000
itineris 4H	0.00	32.66	0.21	0.21			240 mins	Jul 2000
itineris 5H	0.00	21.96	0.21	0.21			300 mins	Jul 2000
itineris 6H	0.00	21.96	0.21	0.21			240 mins	Jul 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
France								
France Telecom Mobiles - Itineris								
itineris 7H	0.00	21.96	0.21	0.21			420 mins	Jul 2000
itineris 8H	0.00	54.08	0.13	0.13			480 mins	Jul 2000
itineris 8H	51.72	56.98	0.15	0.15			480 mins	Jul 2000
itineris 9H	0.00	54.08	0.13	0.13			540 mins	Jul 2000
OLA 2H	0.00	20.88	0.21	0.21			120 mins	Jul 2000
OLA 4H	0.00	27.31	0.21	0.21			240 mins	Jul 2000
OLA Partage 3H	0.00	25.70	0.21	0.21			180 mins	Jul 2000
SFR - SFR Numérique								
ABC	44.98	5.35	0.21	0.21				Jan 1999
Alliance	58.93	27.36	0.14	0.14			120 mins	Jan 1999
Forfait 1h + 1h	44.98	17.67	0.27	0.27			60 mins	Jun 2000
Forfait 2h + 2h	44.98	23.03	0.27	0.27			120 mins	Jun 2000
Forfait 30 + 30	44.98	14.46	0.27	0.27			30 mins	Jun 2000
Forfait 3h + 3h	44.98	31.59	0.21	0.21			180 mins	Jun 2000
Forfait 4h + 4h	44.98	38.02	0.21	0.21			240 mins	Jun 2000
Forfait 5h + 5h	44.98	43.37	0.13	0.13			300 mins	Jun 2000
Sérénité	44.98	23.03	0.11	0.11			120 mins	Jan 1999
SFR Pro 100	44.98	20.88	0.19	0.19			100 mins	Jun 2000
SFR Pro 150	44.98	25.19	0.16	0.16			150 mins	Jun 2000
SFR Pro 200	44.98	29.99	0.13	0.13			200 mins	Jun 2000
SFR Pro 300	44.98	39.10	0.13	0.13			300 mins	Jun 2000
SFR Pro 400	44.98	48.19	0.10	0.10			400 mins	Jun 2000
SFR Pro 600	44.98	84.60	0.10	0.10			800 mins	Jun 2000
SFR Pro 600	44.98	66.39	0.10	0.10			600 mins	Jun 2000
Germany								
DeTeMobil - C-Netz								
C-Tel-Economy	18.81	7.52	0.60	0.15				Jan 1999
DuoCard-Fiftyfifty	0.00	24.84	0.19	0.10				Jan 1999
DuoCard-Standard	0.00	22.58	0.37	0.21				Jan 1999
E-Plus Mobilfunk - E-Plus								
Privat	18.30	7.45	0.37	0.15		0.15		Feb 2001
Professional Group VPN	74.68	261.37	0.04	0.04				Feb 2001
Professional M	0.00	13.08	0.10	0.10				Feb 2001
Professional S	0.00	7.47	0.19	0.19				Feb 2001
Professional XL	0.00	18.67	0.06	0.06				Feb 2001
Time & More 1000	18.30	100.82	0.37	0.15			1000 mins	Feb 2000
Time & More 120	18.30	18.67	0.37	0.15			120 mins	Feb 2000
Time & More 20	18.30	9.33	0.37	0.15			20 mins	Feb 2000
Time & More 240	18.30	29.88	0.37	0.15			240 mins	Feb 2000
Time & More 500	18.30	54.15	0.37	0.15			500 mins	Feb 2000
Time & More 60	18.30	13.07	0.37	0.15			60 mins	Feb 2000
Time & More Message 50	18.30	9.33	0.37	0.15				Feb 2000
Time & More Student	18.30	9.33	0.37	0.15			20 mins	Feb 2000
Mannesmann Mobilfunk - D2								
D2-Classic	18.65	16.79	0.18	0.15		0.06	US$ 3.73	Apr 2000
D2-ClassicPremium	18.65	24.26	0.11	0.06			US$ 3.73	Apr 2000
D2-Fun	18.65	9.32	0.37	0.15		0.06	US$ 3.73	Apr 2000
T-Mobil - D1								
CompanyBasic	0.00	7.90	0.37	0.15		0.06		Mar 2000
CompanyCall	0.00	6.58	0.43	0.43		0.06		Mar 2000
CompanyProfi	0.00	20.08	0.11	0.11		0.06		Mar 2000
ProTel	18.65	24.25	0.11	0.06				Apr 2000
Telly	18.65	9.32	0.37	0.15		0.06	US$ 4.33	Jan 2001
TellyPlus	18.65	18.65	0.18	0.15		0.06		Jan 2001
Viag Interkom - E2								
BusinessPartner	18.30	18.65	0.11	0.11		0.06		Apr 2000
CityPartner	18.30	7.45	0.06	0.06		0.06		Apr 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Gibraltar								
Gibraltar Telecom - Gibtel								
Select 10	84.25	25.27	0.51	0.42			8 mins	Jun 1995
Select 100	84.25	60.66	0.42	0.30			100 mins	Jun 1995
Select 250	84.25	109.52	0.25	0.20			280 mins	Jun 1995
Greece								
Cosmote - Cosmote								
Basic Program 1	0.00	9.60	0.30	0.30				Jul 2000
Basic Program 2	0.00	6.86	0.26	0.26				Jul 2000
Privileged Program 1	0.00	6.86						Jul 2000
Panafon - Panafon								
Panafon-180	0.00	43.90	0.16	0.16			180 mins	May 2000
Panafon-20	0.00	19.21	0.28	0.28			20 mins	Jul 1998
Panafon-300	0.00	61.74	0.13	0.13			300 mins	May 2000
Panafon-500Plus	0.00	61.74	0.10	0.10			500 mins	May 2000
Panafon-60	0.00	30.18	0.28	0.28			60 mins	Jul 1998
Panafon-Basic	0.00	13.72	0.28	0.28				Jul 1998
Panafon 1	0.00	9.60	0.23	0.23				May 2000
Panafon 2	0.00	8.23	0.25	0.25				May 2000
TeleSTET - TeleSTET								
Citylines plus	0.00	10.98	0.13	0.13				Jul 2000
Professional 1	0.00	30.18	0.33	0.26			60 mins	Sep 1999
Professional 2	0.00	45.28	0.28	0.26			120 mins	Sep 1999
Professional 3	0.00	59.00	0.28	0.23			180 mins	Jul 2000
Professional 4	0.00	71.34	0.28	0.21			240 mins	Jul 2000
Professional 5	0.00	82.32	0.28	0.20			300 mins	Sep 1999
TeleSTET 0.5	0.00	8.23	0.25					Jul 2000
TeleSTET Datalink	0.00	8.23						Jul 2000
Greenland								
Telecom Greenland - Telecom Greenland								
Telecom Greenland	141.49	5.59	0.27	0.21				Jan 1997
Guernsey								
Guernsey Telecom - Guernsey Telecom GSM								
Islander	0.00	16.85	0.17	0.17				Jun 1999
Lo-Roamer	0.00	21.06	0.51	0.25				Jun 1999
Roamer	0.00	32.86	0.17	0.17				Jun 1999
Iceland								
Siminn -								
Almenn askrift	27.45	6.86	0.21	0.16				Jan 2001
Fristundaaskrift	27.45	5.61	0.27	0.12				Jan 2001
Gullaskrift	27.45	28.70	0.12	0.12				Jan 2001
Silfuraskrift	27.45	15.60	0.16	0.14				Jan 2001
TAL - TAL								
Ein TAL	0.00	7.49	0.20	0.20				Jan 2001
Fri TAL	0.00	6.24	0.27	0.12				Apr 2000
Tima TAL	0.00	7.36						Jan 2001
Ireland								
Eircell - Eircell GSM								
Eirtime 10	74.15	14.71	0.61	0.25		0.15	10 mins	May 1999
Eirtime 100	74.15	44.49	0.37	0.19		0.15	100 mins	May 1999
Eirtime 250	74.15	88.98	0.30	0.15		0.15	250 mins	May 1999
Eirtime 50	74.15	29.66	0.44	0.22		0.15	50 mins	May 1999
Eirtime 500	74.15	133.47	0.28	0.15		0.15	500 mins	May 1999
Eirtime 750	74.15	177.96	0.27	0.13		0.13	750 mins	May 1999
Timeout 200	25.43	0.00	0.51	0.12			200 mins	Oct 1999

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Ireland								
Eircell - Eircell TACS								
Eircell TACS	74.28	29.71	0.33	0.22				Jan 1995
Eirtime	74.15	14.83	0.67	0.33				Oct 1996
Eirtime-180	74.28	89.14	0.30	0.15			180 mins	Oct 1996
Eirtime-30	74.28	29.71	0.45	0.22			30 mins	Oct 1996
Eirtime-480	74.28	178.28	0.27	0.13			480 mins	Oct 1996
Eirtime-60	74.28	44.57	0.37	0.19			60 mins	Oct 1996
Esat Digifone - Digifone								
DigiFlex	47.36	16.90	0.27	0.17			US$ 6.76	Oct 1999
Esat Digifone - Esat GSM								
Select One	0.00	13.52	0.54	0.17			US$ 5.07	Oct 1999
Select Three	0.00	40.55	0.24	0.17		0.14	US$ 20.28	Oct 1999
Select Two	0.00	27.03	0.27	0.17			US$ 10.14	Oct 1999
Isle of Man								
Manx Telecom - Pronto								
Pronto Business	33.70	39.43	0.30	0.17				Jul 1999
Pronto Personal	33.70	21.06	0.51	0.25			US$ 4.21	Jul 1999
Italy								
Blu - Blu								
Blu Group	2.50	0.00	0.05	0.05				May 2000
Blu Open Forever	0.00	0.00	0.15	0.15				May 2000
Blu2	0.00	0.00	0.03	0.03				May 2000
SuperBlu Forever	0.00	0.00	0.08	0.08				May 2000
Omnitel Pronto - Omnitel Pronto								
Dippiu50	0.00	4.69	0.14	0.14				Jan 2000
Italy	0.00	4.69	0.09	0.09				Jan 2000
Nuovo Personal 195 Day	0.00	4.69	0.09	0.28				Jan 2000
Nuovo Personal 195 Night	0.00	4.69	0.09	0.28				Jan 2000
Telecom Italia - FIDO								
Fido in Citta	0.00	0.00	0.10	0.10				Jan 1998
Fido Insieme	0.00	1.74	0.10	0.10				Jan 1998
Telecom Italia Mobile - TIM GSM								
Autoricarica 190	0.00	2.32	0.10	0.10				Jun 2000
Long TIM	0.00	2.32	0.12	0.12				Jun 2000
Tarifa AutoRicaricabile	0.00	2.32	0.14	0.14				Jun 2000
TIM Duetto	0.00	2.32	0.04	0.04				Jun 2000
TIM MENU	0.00	2.32	0.26	0.26				Jun 2000
TIM MENU Notte	0.00	2.32	0.26	0.09				Jun 2000
TIM MENU Provinicia	0.00	2.32	0.13	0.13				Jun 2000
TIM MENU Sera	0.00	2.32	0.26	0.13				Jun 2000
TIM MENU Tris	0.00	2.32	0.07	0.07				Jun 2000
TIM MENU Weekend	0.00	2.32	0.26	0.09				Jun 2000
Telecom Italia Mobile - TIM TACS								
Autoricarica 190	0.00	16.21	0.10	0.10				Jun 2000
Long TIM	0.00	16.21	0.12	0.12				Jun 2000
Tarifa AutoRicaricabile	0.00	16.21	0.14	0.14				Jun 2000
TIM Duetto	0.00	16.21	0.04	0.04				Jun 2000
TIM MENU	0.00	16.21	0.26	0.26				Jun 2000
TIM MENU Notte	0.00	16.21	0.26	0.09				Jun 2000
TIM MENU Provinicia	0.00	16.21	0.13	0.13				Jun 2000
TIM MENU Sera	0.00	16.21	0.26	0.13				Jun 2000
TIM MENU Tris	0.00	16.21	0.07	0.07				Jun 2000
TIM MENU Weekend	0.00	16.21	0.26	0.09				Jun 2000
Wind - Wind								
24 Ore Light	0.00	4.69	0.28	0.14				Jan 2000
Business Sempre Light	0.00	4.69	0.19	0.19				Mar 1999
Dove	0.00	4.69	0.14	0.14				Jan 2000
Ovunque	0.00	4.69	0.14	0.14				Jan 2000
Quando	0.00	4.69	0.14	0.42				Jan 2000
Sempre Light	0.00	4.69	0.23	0.23				Jan 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Jersey								
Jersey Telecom - JT GSM								
Companion	58.97	30.33	0.17	0.17			US$ 0.00	Oct 1998
Leisure	58.97	29.49	0.67	0.02			US$ 0.00	Oct 1999
Lifestyle	58.97	16.85	0.67	0.17				Oct 1998
Sovereign	58.97	50.55	0.17	0.17			US$ 16.85	Oct 1998
Liechtenstein								
Mobilkom - FL1								
Fun	20.73	15.54	0.36	0.16				Sep 2000
Pro	20.73	31.09	0.36	0.16				Sep 2000
Viag EuroPlattform - Montel								
Montel	30.22	30.22	0.26	0.26				Aug 2000
Luxembourg								
Luxembourg PTT - LUXGSM								
Business	0.00	9.14	0.09	0.09				Oct 2000
Data Only (On Line)	31.52	15.76	0.27	0.15				Oct 1997
Data Only (Stand By)	31.52	10.51	0.63	0.32				Oct 1997
Liberty	0.00	4.57	0.18	0.09				Oct 2000
MIC - Tango								
Hip Hop	0.00	0.00	0.53	0.13				Jun 2000
Twist	0.00	9.14	0.09	0.09				Jun 2000
Malaysia								
Telekom Cellular - TMTouch								
TMTouch	13.16	15.79	0.08	0.04				Jun 1995
Malta								
Vodafone Malta - Vodafone Malta								
Business	54.37	32.51	0.43	0.27				May 2000
Calltime	54.37	16.55	0.69	0.40				May 2000
Monaco								
Monacell - Monacell								
Déclic	0.00	13.91	0.67	0.17				Apr 1998
Evolution 1	0.00	28.79	0.31	0.23			60 mins	Apr 1998
Evolution 2	0.00	36.52	0.31	0.23			120 mins	Apr 1998
Evolution 3	0.00	45.65	0.31	0.23			180 mins	Apr 1998
Evolution 4	0.00	54.08	0.31	0.23			240 mins	Apr 1998
Référence	0.00	23.18	0.42	0.17				Apr 1998
Netherlands								
Ben Nederland - Ben								
Ben bijzonder	0.00	4.91	0.07	0.03		0.02		Jul 2000
Ben extra	0.00	24.54	0.08	0.08			300 mins	Jul 2000
Ben regelmatig	0.00	9.82	0.13	0.13			75 mins	Jul 2000
Ben vaak	0.00	14.72	0.10	0.10			150 mins	Jul 2000
Dutchtone - Dutchtone								
allin	94.56	7.36	0.32	0.12			30 mins	May 2000
Business	29.45	16.36	0.08	0.08			120 mins	May 2000
I-mobile	160.00	15.54	0.32	0.12			90 mins	May 2000
KPN - ATF-4								
FlexiBel Allround	35.56	13.07	0.12	0.07				Jun 2000
FlexiBel Company	192.23	63.44	0.10	0.05				Jun 2000
FlexiBel Economy	35.56	6.53	0.28	0.08				Jun 2000
FlexiBel Premium	35.56	9.80	0.20	0.08				Jun 2000
Libertel - Libertel GSM								
Libertel 120	34.60	16.34	0.18	0.08			120 mins	Jun 2000
Libertel 240	34.60	24.53	0.17	0.08			240 mins	Jun 2000
Libertel 360	34.60	32.70	0.15	0.08			360 mins	Jun 2000
Libertel 60	34.60	11.43	0.21	0.08			60 mins	Jun 2000
Libertel Corporate	192.23	68.05	0.08	0.07				Jun 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Netherlands								
Telfort - Pak&Bel								
Telfort Clarity 120	27.81	13.08	0.07	0.07			120 mins	Jun 2000
Telfort Clarity 180	27.81	16.36	0.07	0.07			180 mins	Jun 2000
Telfort Clarity 240	27.81	19.63	0.07	0.07			240 mins	Jun 2000
Telfort Clarity 300	27.81	22.91	0.07	0.07			300 mins	Jun 2000
Telfort Clarity 360	27.81	26.18	0.07	0.07			360 mins	Jun 2000
Telfort Clarity 60	27.81	9.82	0.07	0.07			60 mins	Jun 2000
Telfort Clarity Weekend	27.81	6.54	0.23	0.08		0.07	30 mins	Jun 2000
Norway								
Netcom - Netcom GSM								
Fritid	23.79	5.95	0.55	0.13				Mar 2000
Gullfisk	0.00	11.77	0.38	0.09				Mar 2000
Helar	0.00	35.56	0.09	0.09				Jan 2000
Standard	17.84	17.72	0.15	0.10				Mar 2000
Storbruker	11.89	29.61	0.09	0.09				Mar 2000
Telenor Mobil - Telenor GSM								
Primær	23.79	18.31	0.13	0.11				Apr 2001
Privat	23.79	5.95	0.44	0.17				Apr 2001
Proff	23.79	26.64	0.11	0.11				Apr 2001
Telenor Mobil - Telenor NMT 450/900								
Primær	23.79	18.31	0.19	0.12				Feb 2000
Privat	23.79	5.95	0.71	0.17				Feb 2000
Proff	23.79	29.61	0.14	0.12				Feb 2000
Portugal								
Optimus - Optimus								
Opção 240	21.38	54.31	0.21	0.11			240 mins	Sep 1998
Opção 30+30	21.38	12.19	0.30	0.30			30 mins	Sep 1998
Opção 60+60	21.38	20.10	0.30	0.30			60 mins	Sep 1998
Plano Base	21.38	8.98	0.30	0.11				Sep 1998
Plano Especial	21.38	32.93	0.13	0.11				Sep 1998
Plano Mais	21.38	20.95	0.24	0.24				Jan 2000
Rede 600	0.00	136.84	0.30	0.30			600 mins	Nov 1998
Telecel - Telecel								
IntraRede	36.35	8.98	0.29	0.29		0.29		Oct 1998
Local	36.35	20.53	0.22	0.22				Jan 2000
Mais	36.35	32.93	0.13	0.13		0.10		Oct 1998
Normal	36.35	21.81	0.23	0.13		0.10		Oct 1998
Privado 120	36.35	12.19	0.38	0.14		0.11	120 mins	Oct 1998
Privado 240	36.35	18.47	0.38	0.14		0.11	240 mins	Oct 1998
Privado 480	36.35	29.72	0.38	0.14		0.11	480 mins	Oct 1998
Privado 60	36.35	10.48	0.38	0.14		0.11	60 mins	Oct 1998
Total 120+30	36.35	29.72	0.38	0.14		0.11	120 mins	Oct 1998
Total 15	36.35	10.48	0.38	0.14		0.11	15 mins	Oct 1998
Total 240+30	36.35	51.10	0.38	0.14		0.11	60 mins	Oct 1998
Total 30+30	36.35	12.19	0.38	0.14		0.11	30 mins	Oct 1998
Total 360+30	36.35	72.48	0.38	0.14		0.11	60 mins	Oct 1998
Total 60+30	36.35	18.47	0.38	0.14		0.11	60 mins	Oct 1998
TMN - TMN C-450								
Executivo	46.38	48.57	0.24	0.16		0.13		Nov 1997
Normal	46.38	32.20	0.35	0.16		0.13		Nov 1997
Pessoal	46.38	21.28	0.73	0.16		0.13	10 mins	Nov 1997

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Portugal								
TMN - TMN GSM								
Base	0.00	10.01	0.33	0.33		0.33		Mar 2000
Executivo	0.00	38.53	0.12	0.12		0.12		Nov 1998
Mega	0.00	12.01	0.33	0.33		0.33		Mar 2000
Normal	0.00	25.52	0.24	0.15		0.12		Nov 1998
Super	0.00	24.02	0.12	0.12		0.12		Mar 2000
TMN 120	0.00	34.27	0.39	0.15		0.12	120 mins	Oct 1998
TMN 120x4	0.00	8,014.00	91.30	35.10		28.10	480 mins	Oct 1998
TMN 15	0.00	12.01	0.39	0.15		0.12	15 mins	Oct 1998
TMN 15x4	0.00	12.01	0.39	0.15		0.12	60 mins	Oct 1998
TMN 30	0.00	13.76	0.39	0.15		0.12	30 mins	Jun 1998
TMN 30	0.00	13.76	0.39	0.15		0.12	30 mins	Oct 1998
TMN 30x4	0.00	13.76	0.39	0.15		0.12	120 mins	Oct 1998
TMN 60	0.00	20.51	0.39	0.15		0.12	60 mins	Oct 1998
TMN 60x4	0.00	20.51	0.39	0.15		0.12	240 mins	Oct 1998
Spain								
Airtel Movil - Airtel								
Bono 100	34.28	0.00			0.17		100 mins	Jun 1997
Bono 150	45.71	0.00			0.15		150 mins	Jun 1997
Bono 30	14.28	0.00			0.24		30 mins	Jul 1998
Bono 300	68.56	0.00			0.13		300 mins	Jun 1997
Bono 60	22.85	0.00			0.21		60 mins	Jun 1997
Plan Mañana	0.00	5.54	0.43	0.07				Jan 1999
Plan Provincial Flexible	0.00	5.54	0.20	0.06				Jan 1999
Plan Provincial Sin Horarios	0.00	5.54			0.16			May 1998
Plan Sin Horarios	0.00	2.86			0.19			Jan 1999
Plan Tarde	0.00	5.54	0.43	0.07				Jan 1999
Retevisión - Amena								
Tarifa Mi Ciudad	0.00	0.00	0.44	0.19			US$ 5.56	Jan 1999
Tarifa Mi Ciudad	0.00	0.00	0.44	0.19			US$ 5.56	Jan 1999
Tarifa Mi Tiempo	0.00	0.00	0.44	0.19			US$ 5.56	Jan 1999
Tarifa Ocio	0.00	0.00	0.67	0.11		0.06	US$ 5.56	Jan 1999
Tarifa Universo	0.00	0.00	0.19	0.19			US$ 5.56	Jan 1999
Telefónica - MoviLine								
Business	19.45	20.84	0.17	0.14		0.08	US$ 66.69	Sep 1998
General	19.45	20.84	0.21	0.14		0.08	0 mins	Apr 1999
Personal	19.45	11.00	0.36	0.14		0.07		Apr 1999
Sin Horas	19.45	17.78	0.19	0.19			30 mins	Jan 2000
Tarde	19.45	11.00	0.36	0.14		0.07	30 mins	Jan 2000
Telefónica - Movistar								
Plus Elección Mañana	19.45	5.56	0.22	0.07				Jan 2000
Plus Elección Tarde	19.45	5.56	0.22	0.07				Jan 2000
Plus Módulo Familiar	19.45	5.56	0.11	0.06				Jan 2000
Plus Módulo Números	19.45	5.56	0.17	0.06				Jan 2000
Plus Planes	19.45	5.56	0.23	0.23				Jan 2000
Plus Próxima	19.45	5.56	0.22	0.06				Jan 2000
Sweden								
Comviq - Comviq GSM								
Bas	21.65	12.45	0.38	0.08				Jun 2000
Comviq Kveld	21.65	8.66	0.43	0.04				May 1999
Dag med Pott	21.65	10.72	0.38	0.38				Jun 2000
Grund	21.65	2.71	0.60	0.08		0.11		Jun 2000
Kveld med Pott	21.65	16.24	0.60	0.04			US$ 16.24	Jun 2000
Europolitan - Europolitan								
Foretag 1	27.06	21.00	0.23	0.12		0.07		Jan 2000
FriTid	27.06	7.04	0.43	0.08			30 mins	Sep 2000
Max	27.06	16.24	0.43	0.05				Mar 2000
Medel	27.06	10.82	0.49	0.08				Mar 2000
Mini	27.06	5.41	0.60	0.11				Mar 2000
Multi	40.59	34.64	0.27	0.07		0.05		Jan 2000

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
Sweden								
Telia Mobitel - Telia GSM								
Fri	27.06	6.49	0.38	0.05				Sep 2000
Pott	27.06	10.28	0.65	0.09				Feb 2000
Volym	28.85	18.75	0.42	0.09				Feb 2000
Telia Mobitel - Telia NMT-450								
450 Rød	0.00	0.00	1.40	0.09	0.25			Jan 2000
Switzerland								
diAx - diAx								
diAx business II	22.39	10.07	0.26	0.17				Feb 2000
diAx business mobile basic	20.73	9.33	0.23	0.15				Oct 2000
diAx business mobile pro	20.73	25.91	0.11	0.11				Oct 2000
diAx 15	20.73	13.11	0.28	0.20			15 mins	Feb 2000
diAx 175	20.73	41.46	0.21	0.13			175 mins	Oct 2000
diAx 300	20.73	62.19	0.16	0.11			300 mins	Oct 2000
diAx 500	20.73	82.90	0.11	0.08			500 mins	Oct 2000
diAx 75	20.73	20.73	0.23	0.18			75 mins	Oct 2000
Orange - Orange								
Personal	20.73	10.36	0.26	0.26				Feb 2000
Plus 100	20.73	10.36	0.52	0.52			100 mins	Jun 2000
Professional	20.73	23.32	0.18	0.18				Feb 2000
Swisscom - Natel								
Business	20.73	38.87	0.13	0.13		0.13		Nov 1999
International	20.73	23.59	0.21	0.16		0.11		Nov 1999
Private	20.73	10.36	0.47	0.21		0.11		Nov 1999
Swiss	20.73	12.95	0.31	0.21		0.11		Nov 1999
Turkey								
Telsim - Telsim								
Disabled	0.00	0.25	0.14	0.14				Oct 2000
Economy	0.00	2.51	0.31	0.31				Oct 2000
Gold Class 90	0.00	18.71	0.20	0.20			90 mins	Oct 2000
Gold Class Family	0.00	4.02	0.20	0.20				Oct 2000
Gold Class Normal	0.00	4.33	0.23	0.23				Oct 2000
Standard	0.00	3.20	0.26	0.26				Aug 1999
Students	0.00	1.88	0.31	0.31				Oct 2000
Turkish Armed Forces	0.00	2.51	0.18	0.18				Oct 2000
VIP Class 210	0.00	37.55	0.15	1.62			210 mins	Oct 2000
VIP Class Corporate	0.00	5.65	0.15	0.15				Oct 2000
VIP Class Normal	0.00	9.23	0.18	0.18				Oct 2000
Turk Telecom - Turkcell								
Economy	0.00	2.53	0.27	0.22				Aug 1999
Exclusive Off Peak	0.00	2.99	0.23	0.11				Dec 2000
My Best Friend	0.00	1.19	0.31	0.31				Dec 2000
Night Tariff	0.00	1.19	0.31	0.06				Dec 2000
Professional	0.00	15.83	0.21	0.17				Aug 1999
Standard	0.00	3.96	0.26	0.22				Aug 1999
Star	0.00	0.00	0.33	0.33				Sep 2000
Support Tariff	0.00	1.67	0.17	0.13				Dec 2000
UK								
BT Cellnet - Cellnet GSM								
Business First	0.00	23.00	0.12	0.12	0.03		100 mins	Jan 2001
My Time Net 200	52.75	19.58	0.54	0.03	0.03		200 mins	Jan 2001
My Time Net 600	52.75	22.61	0.54	0.03	0.03		600 mins	Jan 2001
Net 100	52.75	27.13	0.27	0.08	0.03		100 mins	Jan 2001
Net 100 Local Saver	52.75	30.90	0.15	0.08	0.08		100 mins	Jan 2001
Net 200	52.75	37.68	0.27	0.08	0.03		200 mins	Jan 2001
Net 200 Local Saver	52.75	41.45	0.15	0.08	0.03		200 mins	Jan 2001
Net 400	52.75	60.29	0.27	0.08		0.03	400 mins	Jan 2001
Net 400 Local Saver	52.75	64.05	0.15	0.08	0.03		400 mins	Jan 2001

Tariff ($)	Connection	Monthly	Peak	Off Peak	Standard	Super O/P	Included	Introduced
UK								
BT Cellnet - Cellnet TACS								
Frequent Caller	84.25	42.12	0.42	0.17				Feb 1996
Occasional Caller	42.12	21.52	0.57	0.17			US$ 7.18	Jan 1998
Occasional Caller Inclusive Call Optio	42.12	25.09	0.57	0.17			US$ 9.32	Jan 1998
Social Life	71.69	10.75	0.72	0.07			US$ 2.86	Mar 1999
One 2 One -								
Anytime 75	0.00	26.38	0.15	0.03			75 mins	Jan 2001
Precept 200	0.00	37.68	0.08	0.08			200 mins	Jan 2001
Precept 400	0.00	52.75	0.08	0.08			400 mins	Jan 2001
Precept Max	0.00	113.04						Jan 2001
Talk & Text	0.00	22.61	0.38	0.03			500 mins	Jan 2001
Orange - Orange								
Everyday 50	52.75	22.92	0.53	0.02			50 mins	Jul 2000
Everyday 50	52.75	22.92	0.53	0.02			50 mins	Jul 2000
Talk 10000	52.75	1,416.73	0.15	0.08			10000 mins	Jul 2000
Talk 150	52.75	38.43	0.23	0.08			150 mins	Jul 2000
Talk 1800	52.75	265.64	0.20	0.08			1800 mins	Jul 2000
Talk 500	52.75	88.55	0.20	0.08			500 mins	Jul 2000
Talk 5000	52.75	708.36	0.18	0.08			5000 mins	Jul 2000
Talk 60	52.75	26.38	0.23	0.08			60 mins	Jul 2000
Vodafone - Vodafone GSM								
Leisure 200	0.00	22.59	0.23	0.03			200 mins	Jan 2001
Leisure 200 + Text	0.00	38.42	0.23	0.03			200 mins	Jan 2001
Leisure 500	0.00	22.59	0.51	0.03			500 mins	Jan 2001
Vodafone 1000	0.00	143.18	0.15	0.08			1000 mins	Jan 2001
Vodafone 150	0.00	37.68	0.15	0.08			150 mins	Jan 2001
Vodafone 20	0.00	19.58	0.23	0.08			20 mins	Jan 2001
Vodafone 3000	61.99	693.29	0.21	0.08			3500 mins	Aug 2000
Vodafone 350	0.00	60.29	0.15	0.08			350 mins	Jan 2001
Vodafone 60	0.00	26.38	0.23	0.08			60 mins	Jan 2001
Vodafone 700	0.00	105.50	0.15	0.08			700 mins	Jan 2001
Vodafone Business	0.00	21.10	0.15	0.08			1000 mins	Jan 2001
Vodafone - Vodafone TACS								
Business Call	75.36	37.68	0.38	0.06				Mar 1999
Leisure Call	32.07	19.25	0.64	0.06			US$ 6.42	Jun 1998
Low Call Extra	32.07	22.44	0.64	0.06			US$ 8.33	Jun 1998

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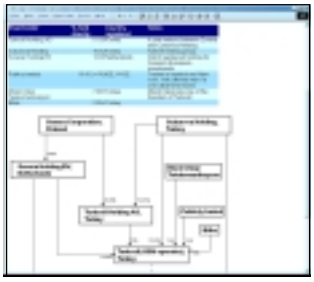

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