

**DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
COMMITTEE FOR INFORMATION, COMPUTER AND COMMUNICATIONS POLICY**

Working Party on Communication Infrastructures and Services Policy

MOBILE BROADBAND: PRICING AND SERVICES

Paris, 8-9 December 2008

The Working Party is invited to discuss the paper and appropriate follow-up.

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JT03256053



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MOBILE BROADBAND: PRICING AND SERVICES

MAIN POINTS

1. Although, the number of OECD countries that publish data on the number of mobile broadband subscribers is not large, growth is significant in markets where data are available. This paper provides an overview of prices, speeds and data caps available from 99 operators providing 3G USB modem based services and 57 providing 3G handset services in 29 OECD countries.
2. The data show that there is a wide range of subscriptions available but with considerable variation between and within countries. Differences are most pronounced in countries where mobile broadband is in its infancy. The number of new mobile terminals and USB modems on the market is stimulating much wider use of mobile broadband by consumers. Prices, as well as caps need to be adjusted for the consumer market which is more price-sensitive.
3. In contrast to 2G services, growth of 3G has been stimulated by terminal manufacturers and application providers. To use the full functionality new terminals Internet access is important as is having low prices for access. Pressure from terminal manufacturers as well as the need by operators for new revenue sources is helping to open up the mobile broadband Internet market to new users.
4. The data indicate that for mobile broadband services via USB modem / PCMCIA card on 3G networks, the average data cap of the surveyed operators is 7.7 gigabytes per month and the maximum advertised speed exceeds 2 mbit/s for most operators. Prices for subscription with 5GB allowance per month vary from less than USD 20 to USD 60 with an average of USD 37.5 (PPP). Price levels and caps often mean that the mobile broadband market is not yet sufficiently competitive with fixed broadband offers, although in some markets with low prices some substitution appears to be taking place.
5. For mobile broadband services with 3G mobile handsets, most providers offer services as add-ons for voice communications. Data allowances, which average 1.4GB per month, are typically less than connections via USB modems. However, services are more affordable and plans, with varying data allowance from 5MB up to 1GB and unlimited plans, are available at less than USD 10 (PPP) in 17 countries.

1. Introduction

6. Operators increasingly use the term “mobile broadband” to market high-speed mobile Internet connections to consumers. Subscriptions which allow access to the Internet outside of a subscriber’s home or office with 3G handsets or USB modems are available from nearly all mobile operators. However, the rapid growth of high-speed mobile access has led to differences of how “mobile broadband” is defined and reported. There is only a limited amount of comparative information to perform fact-based analysis on this important topic. This paper is prepared as an attempt to study the developments of mobile broadband and to provide comparative data to policy makers. It focuses mainly on service aspects of mobile broadband such as price, speed and monthly data allowances as a way to examine current status of mobile broadband services across OECD countries. The paper is aimed at complimenting work underway to define and begin data collection on a consistent basis across OECD countries on mobile broadband.

7. 3G mobile services are available in 29 OECD countries although not always with complete geographic coverage. Operators are in the process of extending service coverage areas and updating technologies to allow for higher connection speeds. In most OECD countries there are still more 2G subscribers than 3G. However, in Japan, 3G subscribers account for 93.7 million out of 104.8 million total mobile subscribers, and 89.7 million subscribers have a mobile Internet subscription as well¹. This figure dwarfs the number of (fixed) broadband connections of 29.3 million².

8. A growing number of subscribers are accessing the Internet with mobile broadband technologies across the OECD. In contrast to 2G services, growth has been stimulated by terminal manufacturers and application providers in the 3G market. A primary example of this has been the rapid diffusion of Apple’s iPhone 3G which was available in 21 countries by July 2008 and is expected to be available in over 70 countries including most of the OECD by the end of 2008. Apple sold over 6 million handsets within 3 months globally and helped push 3G subscriptions, with unlimited data plans, to consumers³. To use the full functionality of this terminal, Internet access is important as is having low prices for access. Pressure from terminal manufacturers as well as the need by operators for new revenue sources is helping to open up the broadband Internet market to mobile users.

9. With 2G mobile penetration surpassing 100% in most OECD countries, the opportunities for growth in the market are becoming limited and average revenue per user has been relatively stagnant so that mobile operators are looking to new growth areas. This is likely to come from upgrading existing 2G subscriptions to 3G⁴. Mobile broadband, rather than voice minutes, will likely be the main growth area in the mobile market as more subscribers upgrade to 3G⁵. Ofcom in the United Kingdom estimates data revenue (not including SMS) accounts for GBP 1.0 billion out of GBP 15.1 billion of total mobile retail revenue⁶. Data from Vodafone shows the data revenue in Europe grew from GBP 1.3 billion to 1.8 billion in 2007 and that it is increasing even in countries where voice revenue is falling⁷. Verizon Wireless reported that its wireless data revenue has increased from USD 2.2 billion in 2005 to USD 7.4 billion in 2007⁸.

10. The number of OECD countries that publish data on the number of mobile broadband subscriber, either as an independent figure or as a subset of overall broadband subscribers, is not large. Table 1 contains a few examples.

Table 1. Mobile broadband data published by NRAs

Country	Data	Frequency
Austria	Telekom Monitor	Q
Denmark	Telestatistik	BA
Finland	Market Review	BA
Ireland	Irish Communications Market	Q
Norway	Det norske ekomarkedet	Q
Portugal	UMTS and data services	Q
Sweden	Swedish Telecommunications Market	A
US	High-Speed Services for Internet Access	BA

Q=Quarterly BA=Biannually A=Annually

Source: OECD

11. In markets where mobile broadband data is available growth is significant, although from a small base. For instance, in Finland the number of mobile broadband subscribers grew from 143 thousand to 307 thousand in the first half of 2008⁹. Growth has been rapid as well in Portugal where subscribers grew 31.6% to 1.9 million in the same period¹⁰. However, definitions of mobile broadband differ from country to country – some countries define it based on technologies and others by the speed of connection or by data allowance. Internationally comparative data for mobile broadband subscriber is not available yet and this makes fact-based analysis much more difficult.

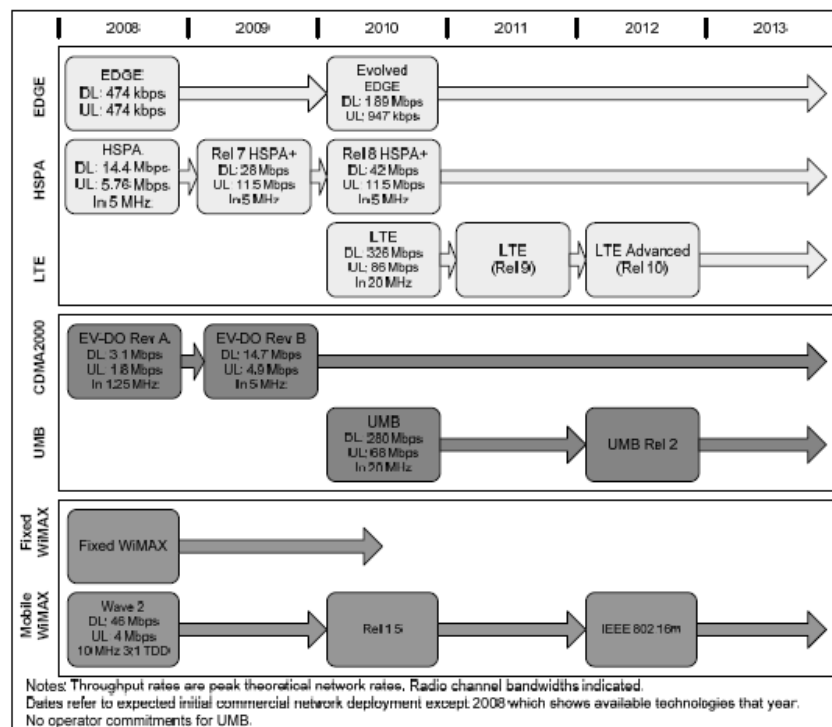
2. Aspects of mobile broadband

12. Analysis of mobile broadband requires a definition which is widely adopted – such a definition is not yet available although work is underway in this area. A definition of mobile broadband services should not rely on specific technologies, connection types or devices used. It should be defined in a more general manner so as to allow the incorporation of newly developing services and the convergence of current services and plans. Many recent developments in the telecommunication sector are tied to converged services, which may not lend themselves well to a narrow categorisation. Some handsets allow connections not only via 3G technologies but via Wi-Fi and Bluetooth radio interfaces as well. Even without these converged devices, plans that package both ADSL and mobile broadband connections for instance, are already available.

13. Services and devices may converge in the future but there are significant differences for consumers in existing markets. For instance, 3G connections via USB modems are categorised differently than connections using handsets. The service packages have different prices and dedicated data volumes. For this reason the examination of 3G mobile subscriptions have been broken down into two categories (modems and handsets) facilitating an examination of developments in each submarket separately, including whether there is competition or convergence between the two.

2.1 Technologies

14. There are a number of technologies available for mobile broadband services, including 3G (IMT-2000), mobile WiMAX (included in IMT-2000), iBurst and PHS. Figure 1 shows the development of HSPA, CDMA2000 and mobile WiMAX and predictions for their growth through 2013. 3G technologies are widely deployed and some operators have announced their intention to begin the process of upgrading to a new high-speed technology LTE (Long Term Evolution) by 2010 when standardisation is expected to be complete. LTE's projected speeds would be much higher than current 3G networks are able to provide.

Figure 1. Evolution of mobile broadband technologies

Source: 3G Americas EDGE, HSPA and LTE Broadband Innovation

2.2 Connection types

15. There are several ways subscribers can connect to the Internet using a mobile broadband connection. First, subscribers can use a dedicated modem to access the network. These modems typically connect to the computer via a USB or PCMCIA interface.

16. Second, subscribers can connect their laptop to a mobile phone which then becomes a modem for Internet access. This is known as tethering.

17. Finally, subscribers connect to the Internet directly using their mobile handset.

18. These three types of connections are widely available on 3G networks. Table 2 summarizes typical features of each connection type. Many operators offer different plans based on the connection type. For instance, independent subscription plans specifically for data communications are offered with USB modems in most cases. Data services are marketed differently with handsets where they are often an add-on to a voice package.

Table 2. Mobile broadband by type of connection

	Via USB modem	Via mobile handset as a modem	Directly from mobile handset
Usage	Data	Data/Voice	Data/Voice
Interface	laptop	laptop	Mobile handset
- mobility	Low	Low	High
- functions (screens, keys, CPU, memory)	High	High	Low

19. Some countries have suggested that mobile broadband should be narrowly defined as data-only subscriptions. One of the difficulties of such an approach is that the narrow definition would not include many key developments in the market which are tied to the bundling of voice and data services. A recent study by Ofcom helps quantify the importance of mobile broadband access via a handset.

20. Ofcom found that 31% of those who accessed the Internet away from home or work used their mobile phone, 23% used a mobile datacard or USB dongle and 20% connected their mobile phone to their laptops¹¹. Taking into account only those who accessed daily, access via a mobile phone (11%) is almost twice as high as access with a mobile datacard or USB dongle (6%) and three times as high as access with a mobile phone tethered to a laptop (4%). Furthermore, boundaries between these categories may become obsolete in the future. Hybrid smartphones are emerging which can provide a direct Internet connection via an interface similar to a PC. The future may see these two categories move closer together.

21. There are a number of early trends emerging in a number of mobile markets. First, the mobile network has been much more of a controlled environment than the PSTN or broadband networks. PSTN and broadband operators have little control over the equipment which subscribers attach to the network. Mobile networks are different and operators have more control over the services and hardware on their networks, although increasingly customers prefer to choose their own terminals.

22. Second, developments in fixed broadband will have an effect on the mobile sector. Markets with lower-speed fixed line offers, particularly with data caps, may see mobile broadband operators enter the market as potential substitutes for fixed-line service. Other markets with high-speed fibre access may be more complementary to wireless service. This can be seen clearly in Japan where subscribers have the highest fixed-line speeds available over the fixed network and make little use of USB modems, despite the large number of 3G subscribers. Most of mobile Internet connections in Japan are with mobile handsets and modem-based 3G accounts for only 2.4 million out of a total of 89.7 million mobile Internet subscriptions¹².

3. Mobile broadband with 3G technologies

23. This section examines the current situation of mobile broadband services which are offered on 3G networks. 3G networks are by far the most widely deployed mobile broadband networks. They are available in over 110 countries including 29 OECD members¹³ and users should theoretically be able to use the same devices across borders. This benefits device manufacturers who can take advantage of scale economies from a larger market.

24. Mobile coverage in each country is also growing. Although the differences in method calculating coverage across countries making direct comparison difficult, some operators claim their 3G coverage attained 99%¹⁴. Some operators have put forward plans to upgrade fixed copper networks with wireless alternatives in some areas as a way to improve the availability of broadband in sparsely populated areas¹⁵. Coverage is expected to continue to grow as demand for high speed service grows and operators work to fulfil coverage obligations which were tied to their licenses.

3.1 Mobile broadband services via USB modem / PCMCIA card on 3G network

25. Table 2 in the appendix provides a listing of 3G mobile broadband plans that were available in October 2008. The following criteria were used to gather the included offers from operator's web sites:

1. Access: Via a USB or PCMCIA card modem
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: UMTS/HSDPA/HSPA or CDMA-2000 1x/EV-DO/Rev.A

4. Fee structure: A minimum data allowance of 100MB or more per month
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included

26. The data collection covered 228 offers from 99 operators across the OECD. Considerable variations are evident among these plans, even within countries. Differences are most pronounced in countries where mobile broadband is still in its infancy.

27. Operators commonly offer multiple plans and differentiate them by monthly data allowances or maximum advertised speeds. Plans which are differentiated by top speed are most commonly found in the Nordic countries. Table 3 breaks down how operators differentiate among mobile broadband plans.

Table 3. How mobile operators differentiate mobile broadband offers (number of operators)

Data allowance	Speed	Data allowance & speed	One plan only
56	8	10	25

Data allowances

28. Monthly data caps are typical for mobile broadband subscriptions. Data caps are more common on mobile broadband services than fixed broadband services which are typically unlimited in many countries¹⁶. Highest monthly data allowances provided by operators range from 400MB to over 30GB per month with a distribution among operators as shown in Table 4. The average data cap of the surveyed operators is 7.7 gigabytes per month. There are 18 providers that have set their highest allowance at 10 GB, while 15 have set it at 5 GB. “Unlimited” data allowances are offered by 22 operators who do not provide an explicit ceiling or fair use limit.

Table 4. Data allowance per month (highest allowance provided by operators) (number of operators)

<1GB	1GB≤ <3GB	3GB≤ <10GB	10GB≤	unlimited	unknown
3	10	33	30	22	1

29. Consumers often do not know how much data traffic they consume and feel more comfortable with “unlimited” services. Some operators try to address this by providing guidance on their website regarding general data use in order for consumers to make more informed decisions. Table 5 is an example of such guidance from the operator 3 in the UK. According to their site a 1 GB cap is enough for 1 hour of web surfing and 100 e-mail exchanges per day (total 834MB in 30 days).

Table 5. Data usage example

	(MB)
Web surfing (per hour)	25.4
Email	0.024
Instant messaging (per hour)	0.013
Document uploading/downloading	1.46
Photo uploading/downloading	0.98
Game software program	781.25
MP3 music file (4min)	7.81
Movie trailer (4min)	48.83

Source: 3 UK, http://www.three.co.uk/personal/products_services/mobile_broadband/usage_calculator.omp

30. One way to put the advertised caps in perspective is to compare them with measures of actual mobile broadband usage. The Portuguese regulator ANACOM publishes quarterly statistics of data volume associated with Internet access from UMTS networks. The statistics show that average usage per active

user per month has increased by 25.3% from 0.91 GB in the 2nd quarter of 2007 to 1.14 GB in the same quarter of 2008¹⁷. Average data volume per session has also increased significantly from 18.9 MB to 27.0 MB.

31. These figures include all types of connections regardless whether they use handsets or modems. Usage from subscribers with dedicated modems is typically assumed to be larger than with handsets as suggested by the larger data caps for modem subscriptions. On this point, statistics from PTS in Sweden¹⁸ provide some insight.

32. PTS reports that the average traffic volume for mobile data services per active user per month increased by almost 7 times in a year to 37.4MB at the end of 2007. Although traffic volume by type of connection (modem or handset) is not measured, the number of active data subscribers with modems increased by over 300% in the same period. This rate is higher than that of mobile data subscribers in general (62%) and connections with dedicated modems now account for 6.2% of all active mobile data connections, up from 2.5% in the previous year. This increase in modem connections could help explain some of the growth in data usage over the period.

33. Another way to put mobile broadband into context is to compare it to fixed-line broadband. MIC Japan estimated average download traffic per (fixed) broadband subscriber as 52.0kbps (30.3kbps for download and 21.7kbps for upload) in May 2008. This is equivalent to 16.06 gigabytes of traffic each 30 days¹⁹. This estimated value is the arithmetic average of the traffic of 29 million fixed broadband subscribers and FTTH connections accounted for 43% of the total subscribers. Of the 99 mobile broadband operators surveyed 6 provided plans with data caps which could accommodate this volume.

Breaching the data limit and maximum prices

34. Once users surpass the data limit for the month they are subject to two possibilities, depending on their operator. In the first case the operator allows the subscriber to continue using the connection but charges an additional fee for incremental traffic until the next billing cycle. 138 of the 228 plans fall into this category. The additional charges vary significantly across providers and can quickly cost much more than the original bundled allowance. Alternatively, operators limit the connection speed for the remainder of the month once the subscriber has used their data cap²⁰.

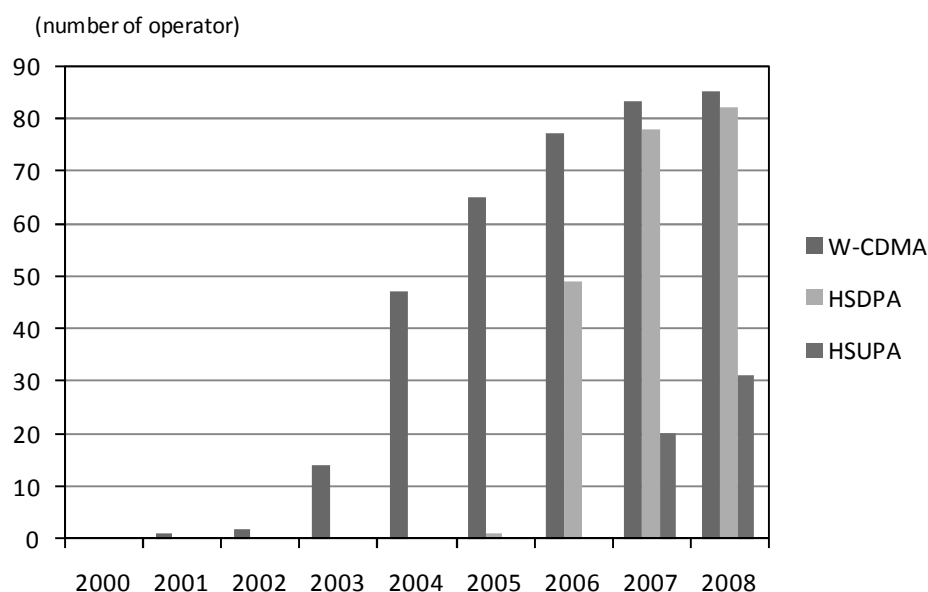
Speeds

35. Some operators offer plans with several connection speeds and Table 6 summarizes the maximum speed offered by each provider. The table indicates that the maximum advertised speed exceeds 2 mbit/s for most operators. 29 operators advertise speeds of 7.2 mbit/s and another 20 advertise speeds of 3.6 mbit/s, the theoretical maximum for HSUPA and HSDPA technologies respectively.

Table 6. Maximum speed offered by operators (number of operators)

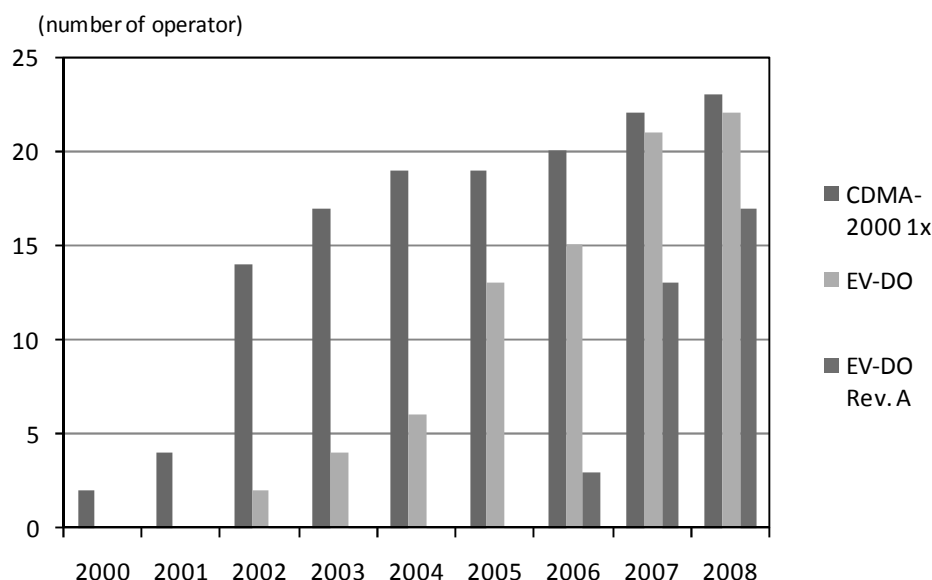
1mbps≤ <2mbps	2mbps≤ <3.6mbps	3.6mbps≤ <7.2mbps	7.2mbps	unknown
6	16	23	29	25

36. Currently, 85 operators in 29 OECD countries are providing services with W-CDMA networks²¹. Its upgraded version, HSDPA and HSUPA, are also available from 82 and 31 operators respectively. The earliest adoption of W-CDMA was in Japan by NTT DoCoMo in 2001 and the rollouts took place through the rest of the OECD between 2003 and 2005. HSDPA technology which first appeared in 2005 was deployed between 2006 and 2007.

Figure 2. Deployment of W-CDMA, HSDPA and HSUPA technologies in OECD countries

Source: OECD, 3G Americas Global UMTS and HSPA operator status

37. Another 3G radio interface, CDMA-2000, is adopted by 23 operators. There are 22 operators who have upgraded to EV-DO and 17 who have taken the further step to EV-DO Revision A. CDMA services in 450MHz band is rapidly expanding especially in Nordic and East European countries²².

Figure 3. Deployment of CDMA-2000 1x, EV-DO and Rev. A technologies in OECD countries

Source: OECD, CDMA Development Group

38. As is the case with fixed broadband, advertised speeds often overstate the true speed of connections by citing a theoretical maximum. A study over a period of 10 weeks in 140 locations in the UK found that average download speeds for mobile broadband services vary from 683 kbit/s to 1.2 mbit/s²³. There are a number of providers, however, who have chosen to advertise based on realistic speeds instead of theoretical maximum speeds.

Table 7. Typical times to receive a file on the mobile broadband network

	Mobile Broadband with typical 7.2 mbps technology	Mobile Broadband with typical 1.8 mbps technology
20 minute video (150MB)	10 minutes	25 minutes
Large presentation (5MB)	20 seconds	50 seconds
Large photograph (2MB)	8 seconds	20 seconds
Word document (250Kb)	1 second	3 seconds

Source: Vodafone, UK,

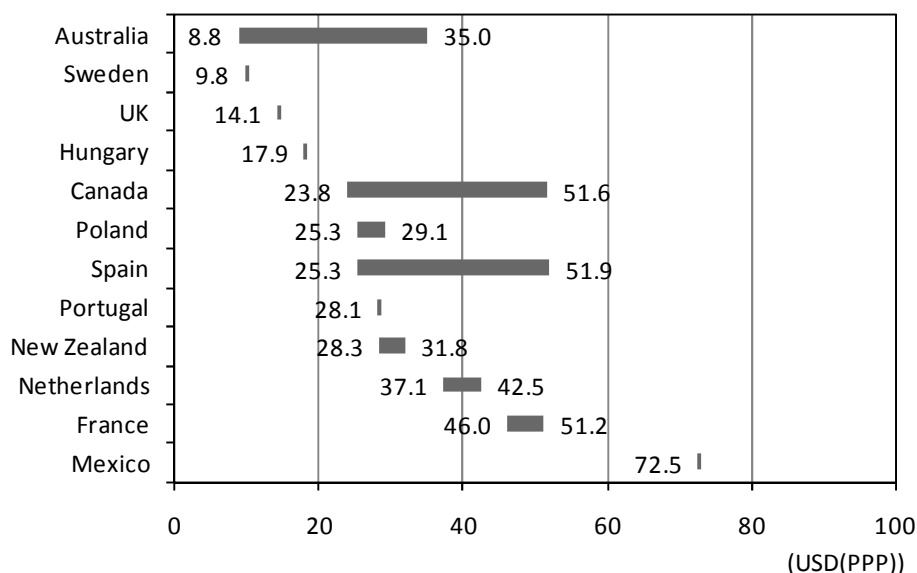
http://www.vodafone.com/start/media_relations/news/local_press_releases/uk_press_releases/2007/vodafone_uk_to_extend.html

Prices

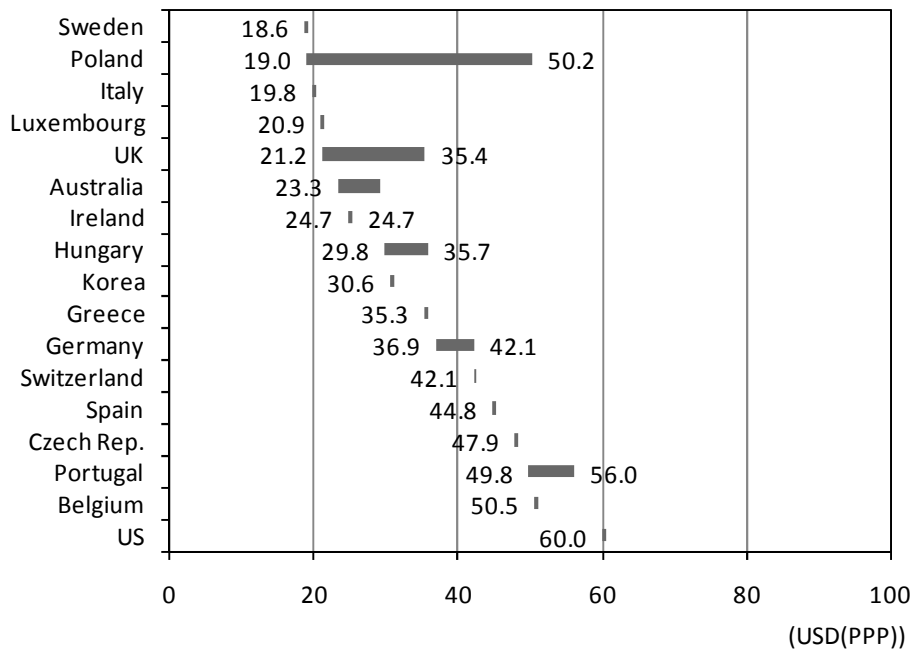
39. This section examines the price of mobile broadband services via a modem. Comparisons are grouped by data caps rather than advertised speeds. This allows for a much more reliable comparison among similar plans. All prices are shown in USD PPP in this section.

40. The first group of offers are subscriptions with 1 GB data caps. Prices range from less than USD 9 to over USD 70 with an average of USD 34.1 per month. Plans are available for USD 10 per month in Australia and Sweden (and in Austria a plan with 3GB allowance is available for as low as USD10).

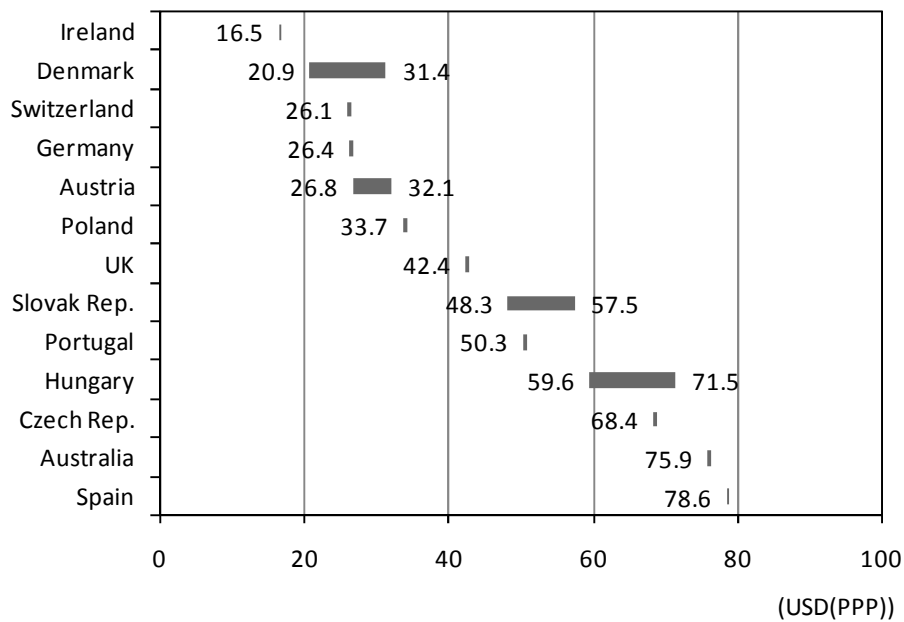
Figure 4. Price ranges for plans with 1GB data allowance



41. The next group of offers consists of plans with up to 5 GB of data usage each month. Prices vary from less than USD 20 to USD 60. The average is USD 37.5 and plans are available for approximately USD 20 in Sweden, Poland, Italy, Luxembourg and UK (and plans with higher allowances are available for USD 20 in Austria and Denmark).

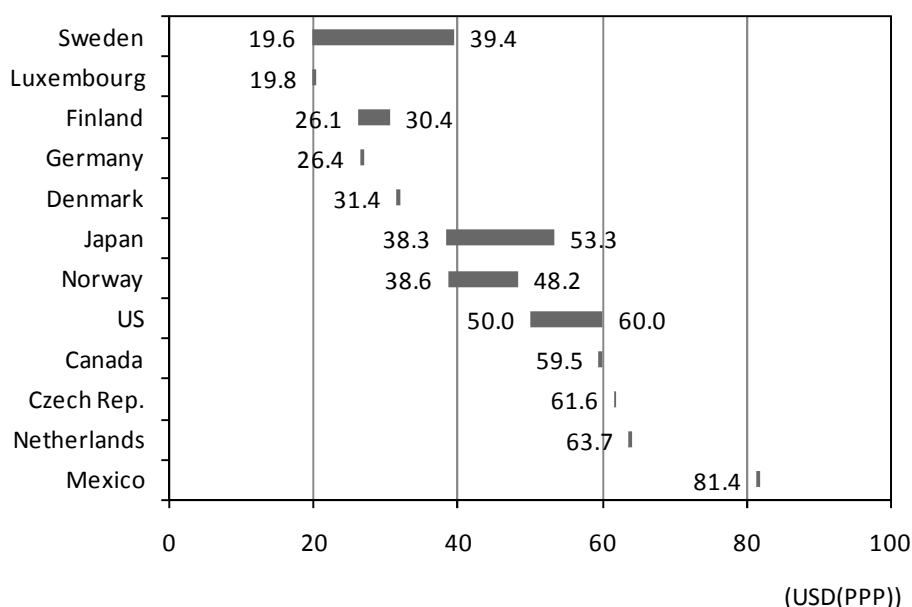
Figure 5. Price ranges for plans with 5GB data allowance

42. The next subset of plans looks at data caps up to 10 GB per month. Prices range from USD 16.5 to USD 78.6 with average of USD 40.9. Plans at around USD 20 are available in Ireland and Denmark (and in Austria a plan with 15 GB of monthly traffic is available for USD 20).

Figure 6. Price ranges for plans with 10GB data allowance

43. The final group of plans looks at offers without data caps. Prices for a monthly subscription are as low as USD 20 to over USD 80 with average of USD 43.5 – Sweden and Luxembourg have plans with prices at USD 20 for plans without any data caps.

Figure 7. Price ranges for plans with “unlimited” data allowance



44. If users exceed their bit cap they often have to pay a set price per additional megabyte of traffic. Table 8 provides a summary of the excess data charges. The price of an additional megabyte of traffic ranges from USD 0.006 to over USD 10.

Table 8. Excess data charges for an additional MB of usage (USD (PPP): number of plans)

<0.01	0.01≤ <0.03	0.03≤ <0.1	0.1≤ <0.3	0.3≤ <1	1≤
5	18	41	42	22	16

45. Some plans have tiered allowance steps instead of a single allowance and for some plans the monthly fee would be reduced if usage does not exceed a certain volume²⁴. Other plans adopt a metered rate with a price ceiling (where traffic beyond that point incurs no additional charges)²⁵.

46. Another key pricing issue are the charges for international roaming. Using a data connection abroad is much more expensive than at home.

47. A European Regulator’s Group report shows that the average retail price for data roaming is declining but is still as high as EUR 5.4 per MB for non-group (non-affiliated) companies and EUR 2.1 for non-group companies as of the end of 1st quarter of 2008²⁶. Charges for international roaming are generally high outside of EU area as well²⁷. Some operators offer packages which provide some international roaming and these prices are highly discounted²⁸.

Prepaid and metered rate plans

48. Prepaid plans are not common in the fixed broadband market, where “always-on” is taken as granted. However, some operators offer prepaid mobile broadband plans in addition to monthly

subscriptions. Most prepaid plans offer a certain volume of data allowance that is valid for a fixed period, while other plans set an allowance by time, instead of data volume²⁹. Some others provide mobile broadband connection simply at a metered rate. In countries where high-speed fixed broadband is widely available both at home and the workplace, pre-paid or metered plans can be suitable for occasional use.

Devices

49. Mobile broadband services are provided with USB or PCMCIA card modems connected to laptop, and some operators now offer mini-notebooks and modems packaged together³⁰. These types of offers may help promote more mobile broadband use³¹. A consortium of PC and microchip manufacturers aims to boost mobile broadband by pre-installing modems into PCs³².

Usage restriction

50. All the plans shown in Table 2 of the appendix allow users to send/receive emails and Internet browsing. Some operators make it clear that certain applications are not allowed on their networks and these applications include audio/video streaming, Voice-over-IP, P2P file sharing and online games³³. However, many operators do not publish their policy on usage restrictions.

3.2 Possibilities for fixed mobile broadband substitution

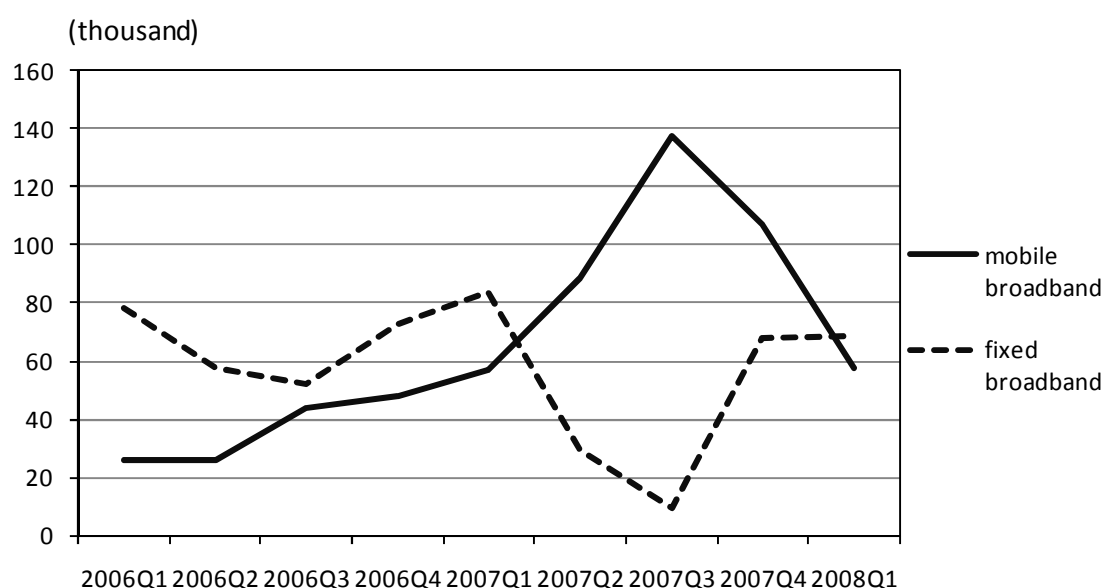
51. Is mobile broadband a substitute to fixed-line broadband? Typically mobile broadband is inferior to fixed broadband in terms of price, data allowances and speed as is shown in Table 9.

Table 9. Comparison of typical broadband services

	Price	Data allowance	Speed	Mobility
Mobile broadband	higher	lower	lower	mobility
Fixed broadband	lower	higher	higher	n/a

52. However, in some countries, mobile network operators provide very attractive plans in terms of price and speed. In Austria for example, mobile broadband connections with a data allowance of 3GB are available at EUR 9 and 15 GB at EUR 20³⁴. The prices are fairly competitive with plans offered by ADSL service providers, such as the incumbent Telekom Austria, assuming subscribers do not go over the allotted data caps. Telekom Austria offers ADSL plans for EUR 39.9 for 2 mbit/s and EUR 59.9 for 4 mbit/s both without data caps³⁵.

53. The lower priced mobile broadband prices are having an impact in Austria. Mobile broadband subscriptions (defined as mobile contract with allowance of 250MB or more per month) have grown significantly from 216 thousand at the end of 2006 to 665 thousand at the end of 1st quarter of 2008 and now accounts for 28.2% of the total for high-speed connections³⁶. Figure 8 shows net growth of mobile and fixed broadband in every quarter.

Figure 8. Net growth of mobile and fixed broadband subscribers in Austria

Source: OECD, RTR, Austria Telekom Monitor

54. Mobile broadband plans are attractively priced in Ireland and the UK as well. Irish operators added more mobile broadband subscribers between 2007 and 2008 than fixed broadband³⁷. In the UK, the number of mobile broadband modem subscriptions increased by more than 510 000 between February to June 2008³⁸.

55. There appears to be some substitution taking place in certain OECD markets but not others. In other markets growth is a function of the demand for mobility and data access.

3.3 *Mobile broadband services via handset with 3G technologies*

56. In contrast with mobile broadband services via USB modem / PCMCIA card, which are typically provided as independent services, mobile broadband services via handset are bundled with voice, either as *i)* add-ons to mobile voice contract or *ii)* package that allows both voice and data communications.

57. Package plans are typically found in France and Italy, where all 3G operators provide such bundled plans, but are available in other countries like Austria, UK and US as well. Some operators make such plans available at as low as EUR 5 per month³⁹, but others bundle internet access services only with plans for heavy users. Although packages are not so widely found across OECD countries so far, it could be available more broadly with the developments of demand, harnessed by growing penetration of 3G networks, handsets and contents.

58. More providers offer mobile broadband services via handset as add-ons for voice communications. Table 3 in appendix shows these services available in October 2008, which match following criteria. 87 plans by 57 operators were found. Most operators, 41 out of 57, provide only one plan, in contrast with services via USB modem / PCMCIA card, where several plans, typically with difference allowance volumes, are available from each operator. This characteristic of the service is seemingly related with other two characteristics, namely small data allowance and lower speed, or less information provided on access speed.

1. Access: directly from handset (some of them allow tethering to laptop as well)
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: UMTS/HSDPA/HSPA or CDMA-2000 1x/EV-DO/Rev.A
4. Fee structure: A minimum data allowance of 100MB or more per month (plans with less data allowance is also included if such plans are not offered by an operator)
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included.

Data allowance

59. Data allowances for mobile broadband services via handset are obviously lower with an average of 1.4GB per month than those of services via USB modem / PCMCIA card (average 7.7GB per month). Table 10 shows the distribution of highest allowances provided by operators. Out of 40 operators with a certain amount of data allowance, 17 set it at lower than 500MB, which enables around 20 hours of web surfing according to the guidance provided before.

Table 10. Data allowance per month (highest allowance provided by operators) (number of operators)

<1GB	1GB≤ <3GB	3GB≤ <10GB	10GB≤	unlimited	unknown
23	9	5	2	15	3

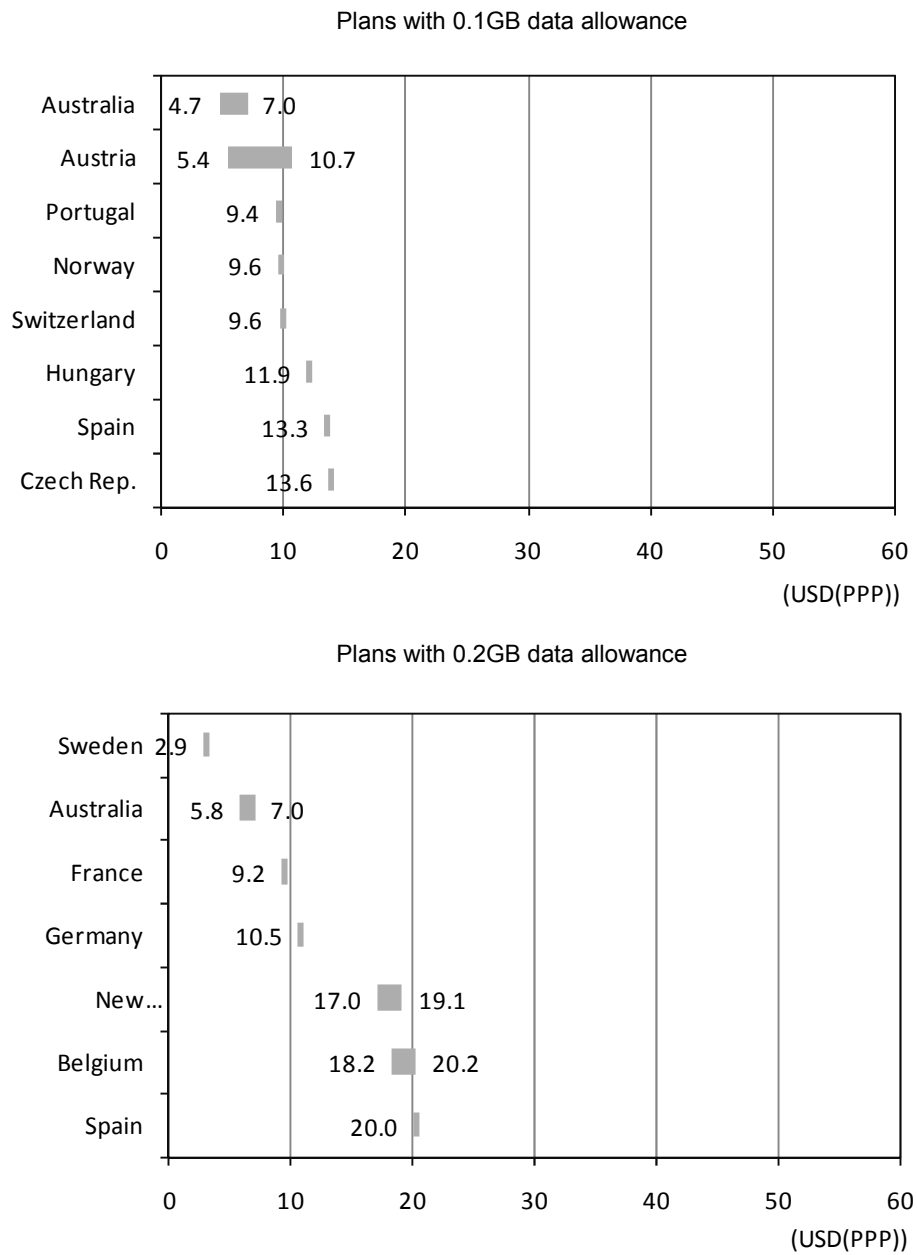
Speed

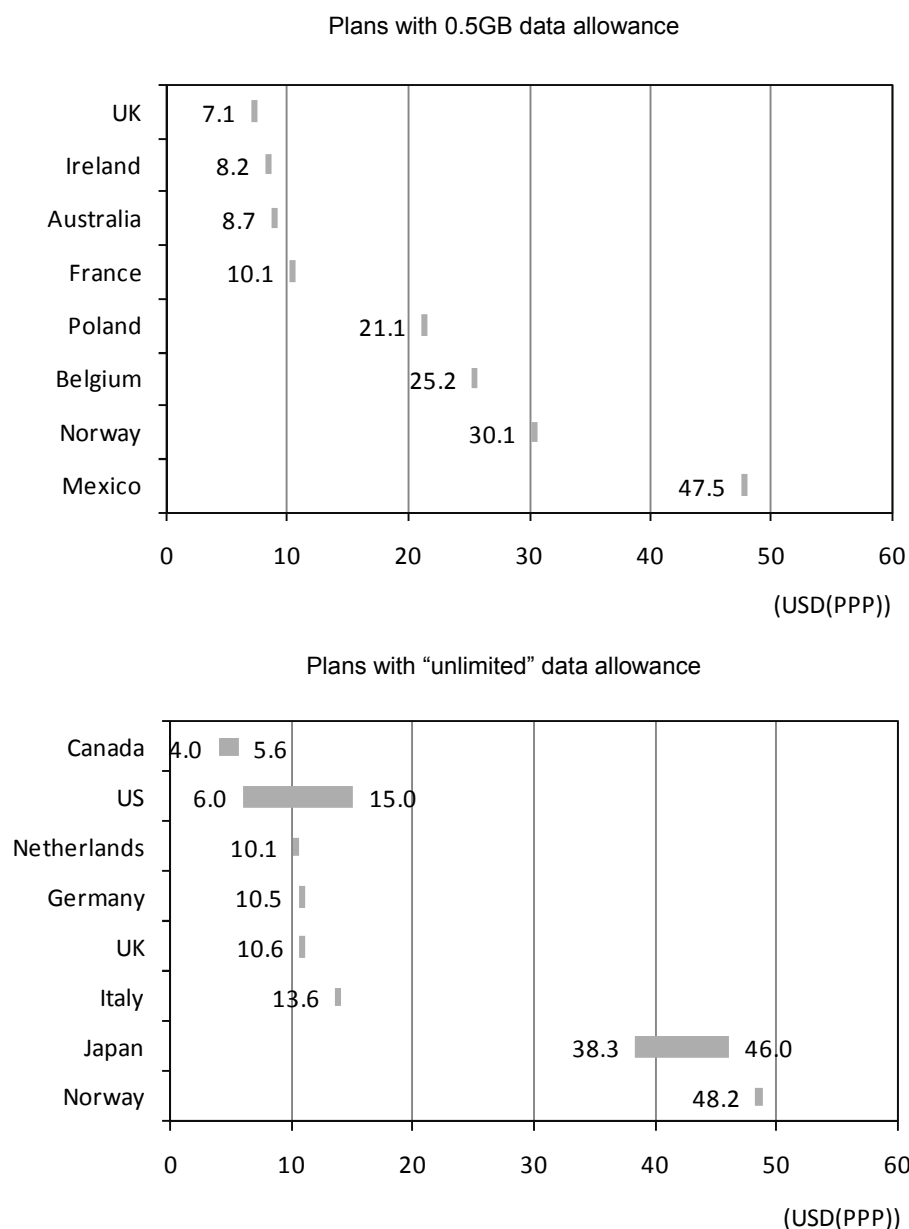
60. Only limited numbers of providers provide information on download / upload speed. Out of those who provide information, some of them set the speed lower than for services via USB modem / PCMCIA card. Still, a few providers offer several plans with various speeds⁴⁰.

Price

61. With smaller data allowance, services via handset are typically priced more affordable. In 17 countries, services are available at less than USD 10 (PPP), with allowance ranging from 5MB to 1GB or unlimited.

62. Figure 9 shows price ranges in each country for plans with certain amount of data allowance, namely 0.1, 0.2, 0.5GB and with “unlimited” allowance.

Figure 9. Price ranges for plans with 0.1, 0.2, 0.5GB and “unlimited” allowance



4. WiMAX

63. Another technology that provides mobile broadband is WiMAX. Fixed WiMAX, standardized as IEEE 802.16-2004, has been playing a key role in the field of fixed wireless broadband access and IEEE added features to the standard so as to support mobility in 2005. In addition to mobility, this technology, called IEEE 802.16e-2005 or mobile WiMAX, supports features that increase spectrum efficiency and provides mobile broadband access.

64. Many operators in OECD countries have indicated that they would provide services with mobile WiMAX technology and have already acquired spectrum necessary for operations. For instance, Clearwire, which has service operations in the US and several other countries, holds spectrum licenses that cover the entire country in Germany, Poland and Spain⁴¹. UQ Communications, Japan, has a nationwide license on

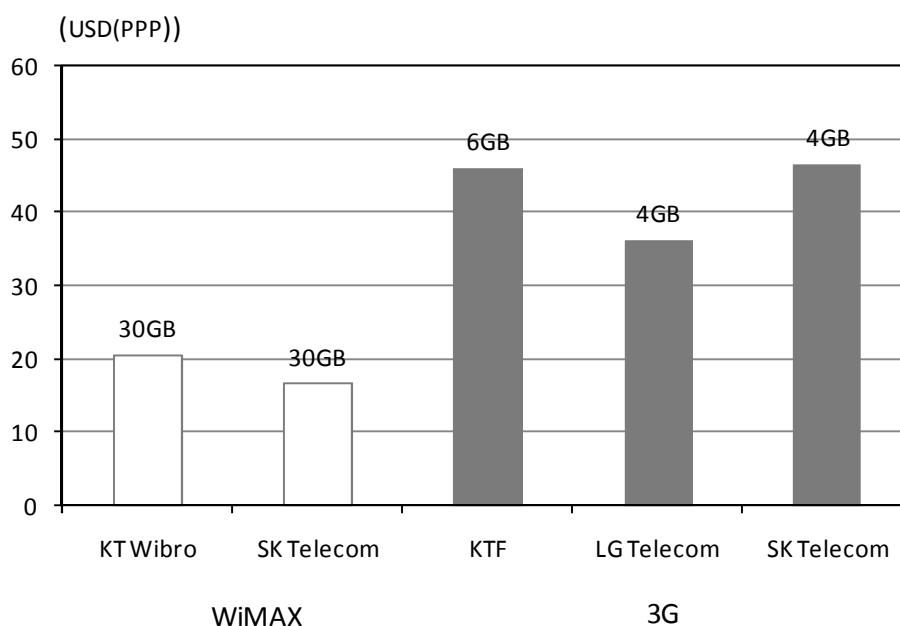
2.5GHz band and is expected to launch its service in February 2009⁴². However, deployment has been delayed and in France, where licenses for 3.5GHz band were issued in June 2006, ARCEP found that only 526 sites had been deployed instead of 3 564 set as obligation as of June 2008⁴³.

65. This section, examines 6 plans offered by 4 operators in Korea and US, which match the following criteria:

1. Access: Via a USB or PCMCIA card modem
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: WiMAX or affiliated technologies
4. Fee structure: A minimum data allowance of 100MB or more per month
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included

66. In Korea KT launched mobile WiMAX, commonly called WiBro in the country, in June 2006, and coverage was expanded to all of metropolitan Seoul and select universities in Gyunggi Province in April 2007⁴⁴. KT's report shows that it provides connections at an average speed of 1mbps and has over 170 thousand WiBro subscribers as of September 2008⁴⁵. Figure 10 shows the price of WiMAX and 3G plan with the largest data allowance by each operator. WiMAX plans are attractively priced as low as USD 16.6 (PPP) for 30GB data allowance per month. WiMAX plans offer 5 times big data volume at less than half price of 3G plans.

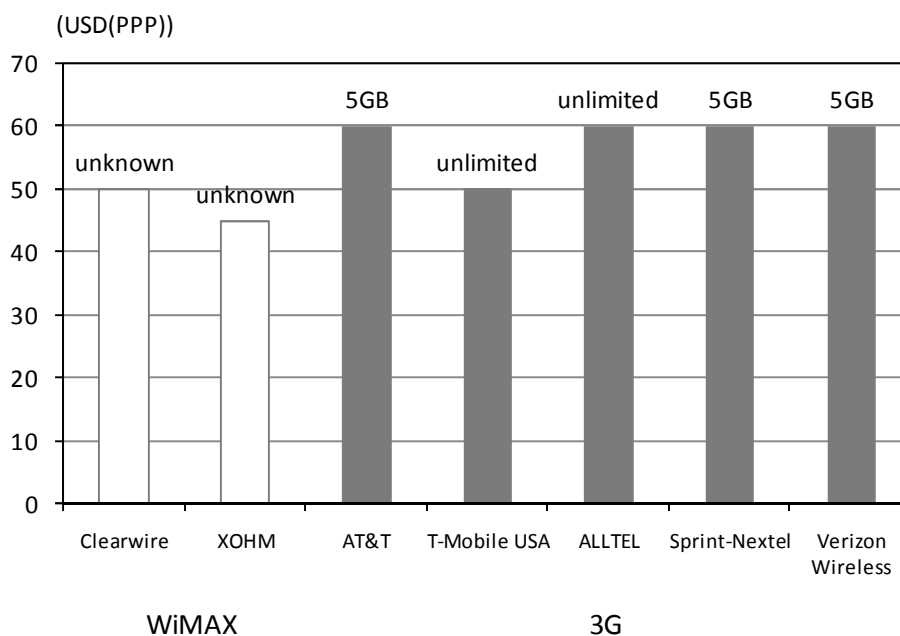
Figure 10. Comparison of monthly charge for WiMAX and 3G plans in Korea



67. In the US, several operators are providing fixed wireless connections with pre-WiMAX and WiMAX technologies. Clearwire, which launched its operation in 2004 and has its pre-WiMAX networks covering an estimated 13.6 million people in 46 markets in the US, released PC cards which greatly enhance users' mobility. The company is expected to deploy mobile WiMAX services in the second half of 2008 and migrate existing networks to mobile WiMAX technologies⁴⁶. XOHM, a business division of telecom operator Sprint Nextel, launched its mobile WiMAX network in Baltimore in September 2008 and claimed the average downlink speed would be 2-4 mbps⁴⁷. It offers several plans, and connections at home

(USD 35 per month) is priced cheaper than plans that allow connection anywhere covered by the network (USD 45)⁴⁸. Figure 11 shows monthly charge for WiMAX and 3G services in the US. WiMax Plans are slightly cheaper than 3G connections but the gap is not as large as in Korea.

Figure 11. Comparison of monthly charge for WiMAX and 3G plans in US



APPENDIX

Table 1. Deployment of 3G technologies in OECD countries

Country	Operator	Technologies and service-in date					
		W-CDMA	HSDPA	HSUPA	CDMA-2000 1x	EV-DO	EV-DO Rev. A
Australia	Hutchison 3G (3)	May-03	Mar-07				
	Sing Tel/Optus	Nov-05	May-07				
	Telstra	Sep-05	Oct-06	Sep-07			
	Vodafone	Oct-05	Oct-06				
Austria	Connect Austria (ONE)	Dec-03	Jun-06				
	Hutchison 3G (3)	May-03	Sep-06				
	mobilkom Austria	Apr-03	Jan-06	Feb-07			
	T-Mobile Austria	Dec-03	Mar-06				
Belgium	Belgacom Mobile (Proximus)	Sep-05	Jun-06				
	Mobistar	Dec-06	Jun-07	Jan-08			
Canada	Rogers Wireless	Nov-06	Nov-06	Jul-08			
	Bell Mobility				Feb-02	Oct-05	Apr-07
	MTS Mobility				Nov-02	Mar-06	
	SaskTel				Apr-03	Aug-05	Feb-08
	TELUS Mobility				Jun-02	Nov-05	May-07
Czech Rep.	Telefonica O2 (Eurotel)	Dec-05	Apr-06		Aug-04	Aug-04	Nov-07
	T-Mobile	Dec-06					
	Mobilkom (U:fon)				May-07	May-07	May-07
Denmark	Hi3G Denmark (3)	Oct-03	Nov-06				
	Sonofon	Sep-06	Sep-07				
	TDC Mobil	Nov-05	Jan-08				
	TeliaSonera	Dec-07	Dec-07	Mar-08			
	Nordisk Mobiltelefon Denmark				Jan-08	Jan-08	Jan-08
Finland	Alands Mobiltelefon	Jun-06					
	Finnet/DNA Finland	Dec-05	Feb-07				
	Elisa	Nov-04	Apr-06				
	Sonera	Oct-04	May-07				
France	Bouygues Telecom	Apr-07	Apr-07	Nov-07			
	Orange France	Dec-04	Oct-06	Jan-08			
	SFR	Nov-04	Jun-06				
Germany	E-Plus	Aug-04					
	O2	Jul-04	Dec-06				
	T-Mobile Deutschland	May-04	Mar-06	Nov-07			
	Vodafone D2	May-04	Mar-06	Jul-07			
Greece	Cosmote	May-04	Jun-06	Apr-08			
	Panafon (Vodafone)	Aug-04	Nov-06				
	WIND Hellas (TIM)	Jan-04	Sep-08				

Country	Operator	Technologies and service-in date					
		W-CDMA	HSDPA	HSUPA	CDMA-2000 1x	EV-DO	EV-DO Rev. A
Hungary	Pannon GSM	Oct-05	Aug-07				
	T-Mobile	Aug-05	Sep-06	Sep-07			
	Vodafone	Jun-06	Jun-07				
Iceland	NOVA	Sep-07	Dec-07				
	Iceland Telecom / Siminn	Sep-07	Sep-07	Sep-07			
Ireland	Hutshison (3)	Jul-05	Dec-06				
	O2	Mar-05	Jul-07				
	Vodafone Ireland	Nov-04	Dec-06				
Italy	H3G (3)	Mar-03	Feb-06	Jul-07			
	TIM	May-04	May-06	Oct-07			
	Vodafone Omnitel	May-04	Jun-06	Sep-07			
	Wind	Oct-04	Jun-07				
Japan	eAccess/eMobile	Mar-07	Mar-07				
	KDDI				Apr-02	Nov-03	Dec-06
	Softbank	Dec-02	Oct-06				
	NTT DoCoMo	Oct-01	Aug-06				
Korea	KTF	Dec-03	Jun-06	Jun-07	May-01	May-02	
	LG Telecom				Oct-00	Sep-07	Sep-07
	SK Telecom	Dec-03	May-06	Oct-07	Oct-00	Jan-02	
Luxembourg	LUX Communications (VOX)	May-05	Jun-07				
	P&T Luxembourg (LUXGSM)	Jun-03	May-07				
	Tele2 (Tango)	Jul-04	Dec-07				
Mexico	Telcel (America Movil)	Feb-08	Feb-08				
	Iusacell				Jan-03	Jul-05	May-07
Netherlands	KPN Mobile (Telefort)	Oct-04	Dec-06	Feb-08			
	T-Mobile Netherlands	Jan-06	Apr-06				
	Vodafone Liberetel	Jun-04	Jul-06				
New Zealand	Vodafone	Aug-05	Oct-06				
	Telecom New Zealand				Jul-02	Nov-04	Dec-06
Norway	Netcom (TeliaSonera)	Jun-05	Apr-07				
	Telenor Mobil	Dec-04	Nov-07				
	Nordisk Mobiltelefon Norway				Jun-06	Jun-06	Oct-07
Poland	Centertel (Orange)	Jun-06	Dec-06	Dec-07			
	P4 (Play)	Mar-07	Mar-07				
	Polkomtel/Plus GSM	Sep-04	Oct-06	Dec-07			
	Polska Telefonía Cyfrowa (Era)	Apr-06	Oct-06				
	SFERIA				Nov-02	Mar-07	Oct-07
Portugal	Optimus	Jun-04	Dec-06				
	TMN (Telemovel)	Apr-04	Apr-06				
	Vodafone Telecel	May-04	Mar-06	Sep-07			
	Zapp (Radiomovel)				May-04	May-05	
Slovak Rep.	Orange Slovensko	Mar-06	Sep-06				
	T-Mobile Slovakia	Jan-06	Aug-06				

Country	Operator	Technologies and service-in date					
		W-CDMA	HSDPA	HSUPA	CDMA-2000 1x	EV-DO	EV-DO Rev. A
Spain	Amena/Orange	Oct-04	Jun-06	Apr-08			
	Telefonica Moviles (Movistar)	May-04	Oct-06	Aug-07			
	Vodafone Espana	May-04	Jun-06	Sep-07			
	Xfera (Yoigo)	Dec-06	Dec-07				
Sweden	Hi3G	May-03	Nov-06	Sep-07			
	TeliaSonera	Mar-04	Jun-07				
	Svenska UMTS-Nat (Tele2)	Mar-04	Apr-07				
	Telenor Sverige AB (Vodafone)	Jul-04	Jun-07				
	Nordisk Mobiltelefon Sweden				May-07	May-07	Oct-07
Switzerland	Orange	Sep-05	Apr-07				
	Swisscom Mobile	Dec-04	Mar-06	Feb-08			
	TDC Switzerland (sunrise)	Dec-05	Feb-07	Mar-08			
UK	Hutchison 3G (3)	Mar-03	Aug-06				
	O2	Mar-05	Feb-07				
	Orange	Dec-04	Feb-07	Apr-08			
	T-Mobile UK	Oct-05	Aug-06	Jul-08			
	Vodafone	Nov-04	Jun-06	Sep-07			
US	AT&T	Jul-04	Dec-05	Nov-07			
	T-Mobile USA	May-08	May-08				
	ALLTEL				Mar-03	Mar-05	Jun-08
	Leap				Dec-01	Sep-07	Apr-08
	Metro PCS				Feb-02		
	Sprint-Nextel				Aug-02	Jul-05	Oct-06
	US Cellular				Oct-02	Jan-07	
	Verizon Wireless				Jan-02	Oct-03	Feb-07

Note: For US, only operators with 1 million subscribers or more (as of End of 2006: based on FCC 12th Annual Report and Analysis of Competitive Market Conditions with respect to Commercial Mobile Services, 2008) are listed.

Source: OECD, 3G Americas Global UMTS and HSPA operator status, CDMA Development Group

Table 2. 3G services via USB modem/PCMCIA card in OECD countries

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
Australia	Hutchison 3G (3)	Broadband 7GB	7	28.6	0.058	3.6
		Broadband 6GB	6	22.8	0.058	3.6
		Broadband 3GB	3	16.9	0.058	3.6
		Broadband 2GB	2	16.9	0.058	3.6
		Broadband 1GB	1	8.8	0.058	3.6
	Sing Tel/Optus	yes' wireless 6GB	6	35.0	0.088	3.6
		yes' wireless 5GB	5	29.2	0.088	3.6
		yes' wireless 2GB	2	23.4	0.088	3.6
	Telstra	BigPond Wireless Broadband 10GB	10	75.9	0.146	6
		BigPond Wireless Broadband 5GB	3	52.6	0.146	6
		BigPond Wireless Broadband 1GB	1	35.0	0.146	6
		BigPond Wireless Broadband 200MB	0.2	17.5	0.146	6
	Vodafone	Mobile Broadband 5GB Heavy Use	5	23.3		1.5
		Mobile Broadband 1GB Light Use	1	11.7		1.5
Austria	Connect Austria (ONE)	Mobiles Internet 15GB	15	21.4		
	Hutchison 3G (3)	3Data Fair	15	21.4	0.107	7.2
		3Data 3GB	3	9.6	0.107	7.2
	mobilkom Austria	A1 Breitband Pakete 10GB	10	32.1	0.107	7.2
		A1 Breitband Pakete 3GB	3	21.4	0.107	7.2
		A1 Breitband Pakete 500MB	0.5	10.7	0.268	7.2
	T-Mobile Austria	FAIRCLICK	10	26.8	0.107	
		FAIRCLICK Smart	3	21.4	0.107	
		FAIRCLICK Basic	0.5	16.1	0.107	
Belgium	Belgacom Mobile (Proximus)	Mobile Internet Anytime Plus (5GB)	5	50.5	0.030	7.2
		Mobile Internet Anytime (2GB)	2	35.4	0.030	7.2
	Mobistar	Internet Everywhere Max	2	30.3	0.030	7.2
Canada	Rogers Wireless	Mobile Internet Cards & Stick Plan 3GB	3	47.6	0.024	
		Mobile Internet Cards & Stick Plan 1GB	1	23.8	0.024	
		Mobile Internet Cards & Stick Plan 500MB	0.5	19.8	0.024	
	Bell Mobility	Connection Card \$50	2	39.7	0.794	
		Connection Card \$30	1	23.8	0.794	
		Connection Card \$25	0.5	19.8	0.794	
	MTS Mobility	MTS Unlimited Email and Surf Feature	unlimited	59.5		2.4
		MTS Mobility Email & Surf 1GB Plan	1	51.6	0.794	2.4
	SaskTel	Wireless Modem Service Plan Unlimited	unlimited	59.5		
		Wireless Modem Service Plan High	1	47.6	0.794	
	TELUS Mobility	Connect Plan 65	1	51.6	0.008	3.1
Czech Rep.	Telefonica O2 (Eurotel)	O2 Internet Mobil 1024 Plus	unlimited	61.6		1
		O2 Internet Mobil 1024	12.16667	47.9		1
		O2 Internet Mobil 512 Plus	12.16667	47.9		0.512
		O2 Internet Mobile 384	unlimited	37.6		0.384
		O2 Internet Mobil 256	2.607143	27.3		0.256
	T-Mobile	Internet Premium	10	68.4	0.006	1
		Internet Standard	5	47.9	0.006	0.512
		Internet Basic	2	27.3	0.006	0.512
	U: fon	U:fon High Speed Internet	8.690476	34.2		3.1

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
Denmark	HI3G Denmark (3)	EazyInternet Premium 7,2 Mbit/s.	unlimited	31.4		7.2
		EazyInternet Classic 1,0 Mbit/s.	unlimited	20.9		1
	Sonofon	Mobilt Bredbånd Fastpris 299	10	31.4		3.6
		Mobilt Bredbånd Fastpris 199	10	20.9		1
		Mobilt Bredbånd Fastpris 99	0.5		10.409	
	TDC Mobil	Bredbånd-2-GO	10	31.4		3
		Bredbånd-2-GO Basic	10	24.1		1
	TeliaSonera	Mobilt Bredbånd flatrate	10	20.9		3
	Nordisk Mobiltelefon Denmark	ICE Broadband		26.2		
Finland	Finnet/DNA Finland	DNA Nettikaista 2M	unlimited	26.1		2
		DNA Nettikaista 1M	unlimited	17.3		1
		DNA Nettikaista 512	unlimited	12.9		0.512
		DNA Nettikaista 384	unlimited	8.6		0.384
	Elisa	Mobiililaajakaista 2M	unlimited	26.2		2
		Mobiililaajakaista 1M	unlimited	17.4		1
		Mobiililaajakaista 512	unlimited	13.0		0.512
		Mobiililaajakaista 384	unlimited	8.7		0.384
	Sonera	Liikkuva laajakaista	unlimited	30.4		3.6
		Liikkuva laajakaista	unlimited	17.3		1
		Liikkuva laajakaista	unlimited	13.0		0.512
France	Bouygues Telecom	forfait PC Internet mobile 3 Go	3	61.4	0.051	3.6
		forfait PC Internet mobile	1	46.0	0.102	3.6
	Orange France	Internet Everywhere forfait avec engagement	1	51.2	0.205	3.6
	SFR	forfait 3Go	3	70.7	0.051	3.6
		forfait ajustable	1	50.2	0.102	3.6
Germany	E-Plus	Internet Flatrate	unlimited	26.4		
		Internet 250 Paket	0.25	10.5	0.527	
	O2	Mobile Datentarife Internet Pack L	10	26.4		3.6
		Mobile Datentarife Internet Pack M	0.2	10.5	0.527	3.6
	T-Mobile Deutschland	web'n'walk connect L	5	42.1		7.2
		web'n'walk connect M	0.3	26.3	0.517	7.2
	Vodafone D2	Mobile Connect Flat	5	36.9		7.2
		Mobile Connect Volume L	0.3	21.0	0.517	7.2
Greece	Cosmote	Internet On The Go Unlimited	30	58.6		7.2
		Internet On The Go 5GB	5	35.3	0.024	7.2
		Internet On The Go 250MB	0.25	17.9	0.120	7.2
	Panafon (Vodafone)	Vodafone Mobile Broadband VMC5GB	5	35.3	0.024	3.6
		Vodafone Mobile Broadband VMC250	0.25	17.9	0.120	3.6
	STET Hellas (TIM)	ADSM Non-Stop	30	58.6		3.6
		ADSM 5GB	5	35.3	0.598	3.6
		ADSM 300	0.3	20.3	0.837	3.6

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
Hungary	Pannon GSM	Mobile Internet 10GB	10	71.5	0.072	
		Mobile Internet 5GB	5	35.7	0.072	
	T-Mobile	Net 15GB	15	89.4	0.060	
		Net 8GB	8	57.2	0.060	
		Net 5GB	5	34.5	0.060	
		Net 3GB	3	23.2	0.060	
	Vodafone	Vodafone Internet 10G	10	59.6	0.036	7.2
		Vodafone Internet 5G	5	29.8	0.036	7.2
		Vodafone Internet 1G	1	17.9	0.179	7.2
		Vodafone Internet 100	0.1	8.9	0.286	7.2
Iceland	Iceland Telecom/Siminn	Netlykill 3	3	36.7	0.147	5
		Netlykill 2	1.5	22.0	0.294	3
		Netlykill 1	0.1	7.3	0.368	1.5
Ireland	Hutshison (3)	Mobile Broadband 10GB	10	16.5	0.041	3.6
	O2	Clear Broadband 18 month	10	16.5	0.016	7.2
	Vodafone Ireland	Vodafone Mobile broadband	5	24.7	0.016	3
Italy	H3G (3)	Tre.Dati.Plus	30.41667	34.3	0.208	7.2
		Tre.Dati	5	19.8	0.006	7.2
	TIM	Maxxi Alice Facile (abbonati)	0.5	20.8	6.238	3.6
	Vodafone Omnitel	Mobile Broadband Unlimited	15	57.2		7.2
		Mobile Broadband XL	0.6	36.4	2.079	7.2
		Mobile Broadband L	0.25	15.6	2.079	7.2
	Wind	Mega 15000	4.77	31.2		
		Mega no limit	2.54	20.8		
		Mega 1500	0.488	8.3		
Japan	eAccess/eMobile	Data Plan	unlimited	38.3		7.2
	KDDI	Packet WIN Single	unlimited	53.3		3.1
	Softbank	Data Value Pack Super	0.427	64.2	0.793	7.2
		Data Value Pack Middle	0.183	48.4	0.992	7.2
	NTT DoCoMo	Teigaku (Flat rate) Data Plan HIGH SPEED	unlimited	52.5		7.2
Korea	KTF	iPLUG	6	46.1	2.694	3.6
		iPLUG	5	30.6	2.694	3.6
	LG Telecom	USB modem	4	36.3	3.108	
		USB modem	2	25.9	3.108	
		USB modem	0.5	15.5	3.108	
	SK Telecom	T LOGIN	4	46.6	0.127	7.2
		T LOGIN	2	31.0	0.191	7.2
Luxembourg	LUX Communications (VOX)	Internet Everywhere Data Large	0.6	10.5	1.361	3.6
		Internet Everywhere Data Medium	0.125	5.2	1.361	3.6
	P&T Luxembourg (LUXGSM)	Mobile Internet Ultra+	25	31.4	0.105	7.2
		Mobile Internet Ultra	5	20.9	0.105	7.2
		Mobile Internet Power	0.5	10.5	0.105	7.2
		Mobile Internet Budget	0.1	5.2	0.105	7.2
	Tele2 (Tango)	Mobile ADSL illimité	unlimited	19.8		7.2
		Mobile ADSL 2GB	2	15.6	0.524	7.2
		Mobile ADSL 500MB	0.5	8.4	1.047	7.2
		Mobile ADSL 100MB	0.1	4.2	1.047	7.2

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
Mexico	Telcel (America Movil)	Banda Ancha TELCEL Ilimitado	3	81.3		1.5
		Banda Ancha TELCEL 1GB	1	72.5	1.252	1.5
		Banda Ancha TELCEL 500MB	0.5	50.0	2.505	1.5
		Banda Ancha TELCEL 150MB	0.15	37.4	3.757	1.5
	Iusacell	Plan BAM Ilimitado	unlimited	81.4		
		Plan Consumo Moderado	0.15	37.6		
Netherlands	KPN Mobile (Telefort)	Mobiel internet Bundel Pro	2.5	58.4	0.106	7.2
		Mobiel internet Bundel Comfprt	1	40.3	0.106	7.2
		Mobiel internet Bundel Start	0.4	21.2	0.106	7.2
	T-Mobile Netherlands	Mobiel breedband Laptop Executive	unlimited	63.7		3.6
		Mobiel breedband Laptop Business	1	37.1		2
		Mobiel breedband Laptop Economy	0.25	21.2		1
	Vodafone Liberetel	Data-abonnementen Nationaal Super	2.5	63.7	0.128	3.6
		Data-abonnementen Nationaal Plus	1	42.5	0.319	3.6
		Data-abonnementen Nationaal Standaard	0.25	21.2	0.319	3.6
New Zealand	Vodafone	Broadband Pro	3	39.6	0.283	
		Broadband Everyday	1	28.3	0.283	
		Broadband Starter	0.2	17.0	0.283	
	Telecom New Zealand	Mobile Broadband 1GB Plus	1	31.8	0.323	
		Mobile Broadband 200 Plus	0.2	19.1	0.323	
Norway	Netcom (TeliaSonera)	Connect Premium	unlimited	48.2		
		Connect Standard	0.5	30.1	0.483	
		Connect Basic	0.1	9.6	0.483	
	Telenor Mobil	Mobilt Bredbånd Fri Bruk	unlimited	48.2		3.6
	Nordisk Mobiltelefon Norway	Mobilt Bredbånd Alltid	unlimited	38.6		
		Mobilt Bredbånd Ofte	0.5	19.2	0.193	
Poland	Centertel (Orange)	Orange Free Platinum	12	63.2		7.2
		Orange Free Premium	6	50.6		7.2
		Orange Free Standard	1	25.3		7.2
	P4 (Play)	Playonline 10GB	10	33.7		1
		Playonline 5GB	5	19.0		1
	Polkomtel/Plus GSM	iPlus prywatnie 160	13	67.5		7.2
		iPlus prywatnie 110	8	46.4		7.2
		iPlus prywatnie 75	3	31.6		7.2
		iPlus prywatnie 60	1	25.3		7.2
	Polska Telefonii Cyfrowa (Era)	blueconnect 119	5	50.2		7.2
		blueconnect 49	0.5	20.7		7.2
	SFERIA	tranSFER swobodny 4GB	4	37.5		3.1
		tranSFER swobodny 1GB	1	29.1		3.1

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
Portugal	Optimus	Kanguru Executivo	10	50.3	0.026	7.2
		Kanguru Profissional	6	41.5	0.026	7.2
		Kanguru Equipas	2	31.5	0.026	7.2
	TMN (Telemovel)	banda larga 7,2	6	56.0	0.031	7.2
		banda larga plus	6	49.8	0.031	3.6
		banda larga	2	37.3	0.031	1
		banda larga light	1	28.1	0.031	0.512
		Vodafone Telecel	5	56.0	0.031	7.2
		Banda Larga 3.6Mbps	5	49.8	0.031	3.6
	Zapp (Radiomovel)	Banda Larga 1.0Mbps	2	37.3	0.031	1
		Banda Larga 512Kbps	1	28.1	0.031	0.512
		Banda Larga Movel 6GB	6	49.8	0.031	2.4
		Banda Larga Movel 2GB	2	37.3	0.031	2.4
		Banda Larga Movel 1GB	1	28.1	0.031	2.4
Slovak Rep.	Orange Slovensko	Mobilný Orange Internet Premium	10	48.3	0.029	7.2
		Mobilný Orange Internet Klasik	2	33.8	0.034	3.6
		Mobilný Orange Internet Start	1.5	24.1	0.058	1.5
		Mobilný Orange Internet	0.9	16.1	0.073	1.5
	T-Mobile Slovakia	Rýchly internet 20	20	109.3	0.017	5.3
		Rýchly internet 10	10	57.5	0.017	2
Spain	Amena/Orange	Tarifa Plana Everywhere sin limites	5	44.8	0.046	
		Tarifa Internet Everywhere	1	33.3	0.046	
	Telefonica Moviles (Movistar)	Tarifa Plana Internet Premium	10	78.6		3
		Tarifa Plana Internet Plus	1	51.9		3
	Vodafone Espana	Tarifa Plana Internet	1	39.9	0.040	1
		Tarifa Plana Navega Plus	1	51.9		3
		Tarifa Navega Mini	1	25.3		
	Xfera (Yoigo)	Internet para llevar	1	28.7	0.017	3.2
Sweden	HI3G	3 Bretband 7.2Mbit/s	unlimited	19.6		7.2
		3 Bretband 0.384Mbit/s	unlimited	9.8		0.384
	Teliasonera	Telia Mobilt bredband Fastpris	unlimited	22.6		7.2
		Telia Mobilt bredband Kväll & helg	unlimited	9.8		0.384
	Svenska UMTS-Nat (Tele2)	Mobilt Bretband MAXI	5	18.6		7.2
		Mobilt Bretband MIDI	1	9.8		7.2
	Nordisk Mobiltelefon Sweden	Mobilt Bredbånd Alltid	unlimited	39.4		
Switzerland		Mobilt Bredbånd Ofte	0.5	19.6	0.197	
	Orange	Internet Everywhere Max	2.5	26.1	0.267	3.6
	Swisscom Mobile	Data Option 5.0 GB	5	42.1	0.053	7.2
		Data Option 1.5 GB	1.5	31.5	0.053	7.2
	TDC Switzerland (sunrise)	T@KE AWAY max	10	26.1		

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)	maximum speed (mbps)
UK	Hutchison 3G (3)	Broadband 15GB	15	42.4	0.141	2.8
		Broadband 5GB	5	21.2	0.141	2.8
		Broadband Lite	1	14.1	0.141	2.8
	O2	O2 Mobile Broadband	3	28.3	0.283	3.6
	Orange	mobile broadband	3	21.2	0.021	1.8
	T-Mobile UK	Mobile Broadband Max	10	42.4		
		Mobile Broadband Plus	3	21.2		
	Vodafone	Mobile Broadband 5GB	5	35.4	0.021	
		Mobile Broadband 3GB	3	21.2	0.021	
US	AT&T	DataConnect	5	60.0	0.480	
	T-Mobile USA	Total Internet for Data Cards	unlimited	50.0		
	ALLTEL	National Wireless Internet	unlimited	60.0		3.1
	Sprint-Nextel	Mobile Broadband Connection Plan	5	60.0		
	Verizon Wireless	BroadbandAccess	5	60.0		

Note: The following criteria were used to gather offers from operator's web sites:

1. Access: Via a USB or PCMCIA card modem
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: UMTS/HSDPA/HSPA or CDMA-2000 1x/EV-DO/Rev.A
4. Fee structure: A minimum data allowance of 100MB or more per month
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included

Source: OECD, operator's web sites

Table 3. 3G services with mobile handset in OECD countries

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB)(USD PPP)
Australia	Hutchison 3G (3)	X-Series Ultimate 40	3	23.4	0.058
		X-Series Ultimate 30	2	17.5	0.058
		X-Series Ultimate 20	1	11.7	0.058
		X-Series Essentials 12	0.2	7.0	0.292
		X-Series Essentials 8	0.1	4.7	0.292
	Sing Tel/Optus	Mobile Internet Ultimate Pack	1	11.7	0.204
		Mobile Internet Super Pack	0.5	8.7	0.204
		Mobile Internet Classic Pack	0.2	5.8	0.204
	Telstra	Browsing Pack Heavy Users	0.3	16.9	0.146
		Browsing Pack Frequent Users	0.15	5.8	0.292
	Vodafone	Internet on Your Mobile	0.1	7.0	0.070
Austria	Connect Austria (ONE)	Internetpaket XL	3	21.4	
		Internetpaket	0.1	5.4	
	T-Mobile Austria	web'n'walk 100&E-Mail	0.1	10.7	0.214
Belgium	Belgacom Mobile (Proximus)	Mobile Internet Anytime 2GB	2	35.4	0.030
		Mobile Internet 500MB	0.5	25.2	0.030
		Mobile Internet 200MB	0.2	20.2	0.030
	Mobistar	Mobile Mail&Surf Max	2	30.3	
		Mobile Mail&Surf	0.2	18.2	
Canada	Rogers Wireless	Unlimited On-Device Mobile Browsing Plan	unlimited	5.6	
	SaskTel	Unlimited Mobile Browser Plan	unlimited	4.0	
	TELUS Mobility	Wireless Web	unlimited	5.6	
Czech Rep.	Telefonica O2 (Eurotel)	O2 Internet on your mobile	0.15	8.6	
	T-Mobile	Internet v mobilu surf&mail+	0.1	13.6	
Denmark	Sonofon	Surf Mobile	0.005	0.9	1.051
	TDC Mobil	Surfin '	0.05	7.3	0.631
Finland	Elisa	Datapaketti	0.025	3.5	0.140
France	Bouygues Telecom	OPTION WEB & MAIL	0.5	10.1	
	Orange France	internet max	0.2	9.2	
	SFR	PASS SURF 2.0	0.5	10.1	
Germany	E-Plus	Surf&Mail Flatrate		5.3	
	O2	Mobile Datentarife Internet Pack L	10	26.4	
		Mobile Datentarife Internet Pack M	0.2	10.5	0.527
	T-Mobile Deutschland	web'n'walk HandyFlat	unlimited	10.5	
	Vodafone D2	Vodafone live! InternetFlat		10.5	
Hungary	Pannon GSM	Mobile Internet 100	0.1	11.9	0.596

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB)(USD PPP)
Ireland	Hutshison (3)	mobile surfing 10GB	10	16.5	
		mobile surfing 1GB	1	8.2	
	O2	O2 Mobile Internet	0.25	6.2	
	Vodafone Ireland	Add on Mobile Internet	0.5	8.2	4.123
Italy	Vodafone Omnitel	Promozione Mobile Internet Data Pack	unlimited	13.6	
Japan	eAccess/eMobile	Keitai Plan	unlimited	38.3	
	KDDI	Double Teigaku	unlimited	46.0	
	Softbank	Packet Teigaku Full	unlimited	46.0	
	NTT DoCoMo	Packet Hodai Full	unlimited	46.0	
Luxembourg	LUX Communications (VOX)	Internet Everywhere Data Large	0.6	10.5	1.361
		Internet Everywhere Data Medium	0.125	5.2	1.361
Mexico	Telcel (America Movil)	Paquetes Internet Telcel 3G Ilimitado	3	81.3	
		Paquetes Internet Telcel 3G 1GB	1	57.5	1.252
		Paquetes Internet Telcel 3G 500MB	0.5	47.5	2.505
		Paquetes Internet Telcel 3G 150MB	0.15	32.4	3.757
Netherlands	T-Mobile Netherlands	web'n'walk Plus	2	15.9	
		web'n'walk Standard	unlimited	10.6	
	Vodafone Liberetel	BloX voor Internet	unlimited	10.1	
New Zealand	Vodafone	Broadband Pro	3	39.6	0.283
		Broadband Everyday	1	28.3	0.283
		Broadband Starter	0.2	17.0	0.283
	Telecom New Zealand	Mobile Broadband 1GB Plus	1	31.8	0.323
		Mobile Broadband 200 Plus	0.2	19.1	0.323
Norway	Netcom (TeliaSonera)	Connect Premium	unlimited	48.2	
		Connect Standard	0.5	30.1	0.483
		Connect Basic	0.1	9.6	0.483
Poland	Polska Telefonía Cyfrowa (Era)	blueconnect 500	0.5	21.1	0.506
Portugal	Optimus	Tarifários Internet	0.1	9.4	
	Vodafone Telecel	Aditivo Navegar	0.1	9.4	
Slovak Rep.	T-Mobile Slovakia	web'n'walk Giga	1	4.8	
Spain	Telefonica Moviles (Movistar)	Bono Internet Mensual	1	58.6	
		Internet en el Móvil Plus	0.2	20.0	
		Internet en el Móvil	0.1	13.3	
	Vodafone Espana	Internet en el Móvil	0.15	16.0	
Sweden	TeliaSonera	Surfport		9.8	
	Svenska UMTS-Nat (Tele2)	Datapaket Fri surf	5	15.7	
		Datapaket 1 GB	1	8.8	
		Datapaket 200 MB	0.2	2.9	0.167

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB)(USD PPP)
Switzerland	Swisscom Mobile	NATEL surf option 100MB	0.1	9.6	1.333
	TDC Switzerland (sunrise)	Sunrise surf	0.05	4.0	0.800
UK	Hutshison 3G (3)	Add Internet Max	1	7.1	
	O2	Unlimited Web Bolt On	unlimited	10.6	
	Orange	Orange World Monthly Access	0.25	10.6	
	T-Mobile UK	monthly web'n'walk access	1	7.1	
	Vodafone	Mobile Internet and email pack	0.5	7.1	
US	AT&T	MEdia Net Unlimited (Web)	unlimited	15.0	
	T-Mobile USA	Total Internet Add-on	unlimited	6.0	
	Sprint-Nextel	Data Pack	unlimited	10.0	

Note: The following criteria were used to gather offers from operator's web sites:

1. Access: directly from handset (some of them allow tethering to laptop as well)
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: UMTS/HSDPA/HSPA or CDMA-2000 1x/EV-DO/Rev.A
4. Fee structure: A minimum data allowance of 100MB or more per month (plans with less data allowance is also included if such plans are not offered by an operator)
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included.

Source: OECD, operator's web sites

Table 4. WiMAX services in OECD countries

Country	Operator	Name of Plan	Data allowance (GB)	Price per month (USD PPP)	Out of bundle charge (per MB) (USD PPP)
Korea	KT Wibro	Unrestricted plan	30	20.5	0.010
		1GB plan	1	10.4	0.026
	SK Telecom	Wibro free 30	30	16.6	0.010
		Wibro mini	0.5	10.4	0.026
US	Clearwire	pc card		50.0	
	XOHM	On-the-Go		45.0	

Note: The following criteria were used to gather offers from operator's web sites:

1. Access: Via a USB or PCMCIA card modem
2. Speed: A maximum potential speed of 256 kbit/s or more
3. Technologies: WiMAX or affiliated technologies
4. Fee structure: A minimum data allowance of 100MB or more per month
5. Duration of Contract: 24 months
6. Discounts: Any discounted offers for bundled services are not included

Source: OECD, operator's web sites

Table 5. PPP in national currency units per USD (average of September 2008)

Australia	1.71
Austria	0.93
Belgium	0.99
Canada	1.26
Czech Republic	17.38
Denmark	9.51
Finland	1.14
France	0.98
Germany	0.95
Greece	0.84
Hungary	167.75
Iceland	135.92
Ireland	1.21
Italy	0.96
Japan	130.10
Korea	965.10
Luxembourg	0.95
Mexico	7.99
Netherlands	0.94
New Zealand	1.77
Norway	10.35
Poland	2.37
Portugal	0.79
Slovak Republic	20.68
Spain	0.87
Sweden	10.14
Switzerland	1.88
Turkey	1.20
United Kingdom	0.71
United States	1.00

NOTES

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- ³ Sales surpassed 1 million within 3 days of the iPhone 3G's release and reached 6.89 million in 3 months ending September 27 2008. <http://www.apple.com/pr/library/2008/07/14iphone.html> at p. 19
<http://ccbn.10kwizard.com/xml/download.php?repo=tenk&ipage=5932730&format=PDF>
- ⁴ Mobile subscriber penetration rates in the EU increased more than 8 percentage point to 111.8% on October 2007. The rate surpassed 100% in 21 out of 27 OECD countries. See Commission of the European Communities, Progress report on the single European electronic communications market 2007 (13th report) at p.10 http://ec.europa.eu/information_society/policy/ecomm/doc/library/annualreports/13th/com_2008_153_en_final.pdf
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<http://www.ofcom.org.uk/research/cm/cmr08/>
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- ¹¹ Ofcom Communications Market Report 2008 at p.69, <http://www.ofcom.org.uk/research/cm/cmr08/>
- ¹² Telecommunications Carriers Association, Japan, <http://www.tca.or.jp/database/2008/09/>
- ¹³ 3G Americas, Global UMTS and HSPA operator status,
http://www.3gamericas.org/pdfs/Global_3G_Status_Update.pdf
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<http://www.telstra.com.au/nextgnetwork/coverage.htm>

NTT DoCoMo, Japan, states that its coverage of W-CDMA and HSDPA networks reached 100% and 98 % respectively, at p. 38

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24 For instance, Rogers Canada offers Flex Rate Plan which consists of 5 tiers of allowance (0.5, 1, 2, 3, 5GB). Users would move automatically to a higher tier if usage exceeds the data allowance.
https://www.rogers.com/web/content/wireless-plans/iphone_card_plans

25 NTT DoCoMo's Teigaku (Flat rate) Data Plan HIGH SPEED consists of 3 tiers. Up to 0.5 million packets (equivalent to 64 MB) is charged at a fixed price of JPY 3 465 (or USD 26.6 (PPP)), then prices move to a measured rate up until JPY 5 985 (or USD 46.0 (PPP)), and beyond this point no more additional fee would be charged. (ISP fees are charged in addition to this amount.)
http://www.nttdocomo.co.jp/service/data/foma/flat_rate/bill_plan/index.html

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NTT DoCoMo charges JPY 0.2 for 1 packet (equivalent to 128 byte) for data communications roaming in Europe. That means JPY 1638.4 (or USD 12.6 (PPP)) per MB.
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