

The International Communications Market 2006

2 Telecoms

<u>2.1</u>	<u>Key market developments</u>	45
2.1.1	Recent market activity	45
2.1.2	Technological developments	46
2.1.3	Regulatory developments	54
<u>2.2</u>	<u>The telecoms industry</u>	59
2.2.1	Total telecoms revenue has risen slowly in most countries...	59
2.2.2	...but fixed-line voice revenue has declined...	60
2.2.3	...while mobile revenue has grown sharply	61
2.2.4	Mobile forms an ever-increasing proportion of telecoms revenue	62
2.2.5	Within mobile, voice revenue grows in most countries...	62
2.2.6	...while mobile data revenue has grown at a faster rate...	63
2.2.7	...meaning that data forms an increasing proportion of mobile revenue	64
2.2.8	Broadband revenue rose strongly between 2004 and 2005	65
2.2.9	Germany and UK have greatest diversity of fixed-line supply	66
2.2.10	The UK has one of the most diversified mobile markets	67
2.2.11	MVNOs have significant market share in Germany and UK	68
2.2.12	Broadband market concentration differs widely between countries	69
2.2.13	Total fixed-line voice volumes remain constant	69
2.2.14	Total volume of mobile calls grows rapidly since 2001	70
<u>2.3</u>	<u>The telecoms user</u>	72
2.3.1	China grows to first place in fixed lines	72
2.3.2	China also pulls away in mobile subscriptions...	73
2.3.3	...but remains at the bottom of the pack for mobile penetration	74
2.3.4	Pre-pay/post-pay mix varies significantly between countries	74
2.3.5	3G penetration is highest in Japan, while Italy tops European 3G league	75
2.3.6	US leads in broadband connections, but China is catching up fast	79
2.3.7	The UK climbs the broadband penetration league	80
2.3.8	Broadband delivery platforms vary widely, but tend towards DSL	81
2.3.9	Fixed-line average revenue per user is in decline almost everywhere	82
2.3.10	Mobile ARPU stabilises as increased usage counters falling prices	83
2.3.11	Broadband ARPU falls as operators cut prices	84

2.1 Key market developments

Figure 2.1: Key indicators

Telecoms	UK	France	Germany	Italy	USA	Japan	China
Telecoms service revenues	£24.8bn	£21.6bn	£31.9bn	£25.4bn	£126.4bn	£75.4bn	£36.4bn
Telecoms revenues per capita	£411	£357	£387	£437	£429	£592	£28
Fixed lines per 100 population	56.2	54.6	65.8	45.8	59.6	50.8	26.9
Mobile connections per 100 pop	108	77	96	123	70	71	29
Share of mobile post-pay	34%	64%	50%	9%	92%	97%	37%
3G connections per 100 pop	7.6	5.7	6.7	18.6	0.9	22.7	0.0
B'band connections per 100 h'holds	39.3	37.5	28.3	30.9	38.0	43.9	11.6
DSL as % of broadband connections	73.3%	94.0%	97.2%	94.8%	42.2%	64.8%	71.8%
WiFi hot-spots	10.7k	9.8k	8.6k	1.8k	26k	6.8k	3k

2.1.1 Recent market activity

Most of the major fixed-line network operators have focused on evolving their broadband and online strategies over the past year. This includes major pushes into Voice over Internet Protocol (VoIP) and converged voice services. Many incumbent fixed voice operators have responded to the perceived or actual threat from internet service providers (ISPs) offering cheaper VoIP services in conjunction with broadband internet connectivity. France Telecom, AT&T and BT all introduced VoIP services during 2006, largely in response to the growing visibility of VoIP in the market. The next evolution – wireless VoIP – has just begun, with the recent introduction of WiFi VoIP handsets. Combined wireless VoIP/cellular handsets will enable customers to make cheap or free mobile calls when they are within a WiFi 'cloud', and to roam onto cellular networks at other times. This is likely to pose significant threats and opportunities for the cellular operators, as well as continue competitive pressure on fixed-line players.

The fixed-line operators are also keen not only to capture significant portions of the broadband connections market (usually via DSL), but also to secure access to content. In the UK, for example, BT is due to launch its BT Vision service by the end of 2006, providing connectivity, proprietary content and aggregated programming. In the US Verizon is competing directly with cable operators for the rights to screen Hollywood content, which it plans to transmit over its new fibre network, and in Belgium, Belgacom has bought premium football television rights. In the US, AT&T is building a portal presence with its BlueRoom service and in Europe Telecom Italia and France Telecom already offer full IPTV services.

Fixed-line operators' concern about the erosion of traditional fixed-line voice revenues has led to the emergence of two operator strategies designed to protect existing revenue streams.

- The first of these is **consolidation at an operator level**, and although none of the major players has been involved in major corporate merger/acquisition activity over the past six months there has been activity in LLU markets, an example being Carphone Warehouse's purchase of One.Tel and Tele2 in the UK at the end of 2005.

- The second strategy is that of **consolidation across platforms**, to allow players to take advantage of bundling opportunities, and as a defensive move to compete with operators already providing such services. There has been corporate activity in the mobile and internet sectors, where Vodafone sold its stakes in Japan and Belgium but has new agreements with BT and Fastweb to provide fixed services in the UK and Italy. Telefonica-owned O2 bought ISP Be in the UK, and ntl:Telewest bought Virgin Mobile (also in the UK).

Among mobile operators, there has been an increased focus on 3G services, and in particular on the implementation of high-speed downlink packet access (HSDPA) technology. Newly-launched services include mobile internet and TV applications – almost every major mobile player has either trialled or launched these advanced products during 2006. Mobile operators are also making renewed efforts to consolidate and enhance their customer bases, with an emphasis on reducing churn (the number of customers leaving their network to join another) and on converting pre-pay customers onto more lucrative post-pay contracts.

The sector with the highest current profile in the financial community has been internet services (both content and applications). Google, which enjoys growing advertising revenues, has made a number of major acquisitions, most notably that of online video site YouTube, and has struck an online advertising deal with media giant NewsCorp. Apple's iTunes site has continued to lead the audio (and now video) downloading landscape, and social networking/blogging sites such as MySpace and Livejournal continue to explode in popularity.

2.1.2 Technological developments

Japan and France lead on VoIP

Voice over IP (VoIP), sometimes also known as Voice over Broadband, is an innovative new service that enables users to make and receive telephone calls via their broadband connection. There are four types of VoIP:

- **Peer-to-peer (P2P)** VoIP is based on file-sharing technology and is a software-only solution, an example being Skype's original offer. Users make calls using IP addresses instead of phone numbers and can usually only call people with the same brand of VoIP (enclosed user groups). Calls completely bypass the traditional fixed-line network (the Public Switched Telephone Network or PSTN) and are usually free.
- **Other PC-to-PC** VoIP services direct calls via a central server, examples being Yahoo! Messenger, GoogleTalk and Windows Live Messenger. These tend to have evolved from instant messaging backgrounds and although, like P2P VoIP services, calls are made to IP addresses, there is some interoperability between different services. Again, these services bypass the PSTN and calls are usually free.
- **Outgoing PSTN** VoIP services enable users to make VoIP calls to fixed telephones, and the VoIP provider pays termination charges to the terminating network. If the user calls another VoIP user, the call is usually free, while calls to regular PSTN or mobile recipients are generally charged, although usually at a lower level than an equivalent PSTN-originated call.
- **Incoming PSTN** VoIP enables incoming calls to users from PSTN and mobile phones by assigning a regular telephone number to the VoIP user. Often the user is charged a

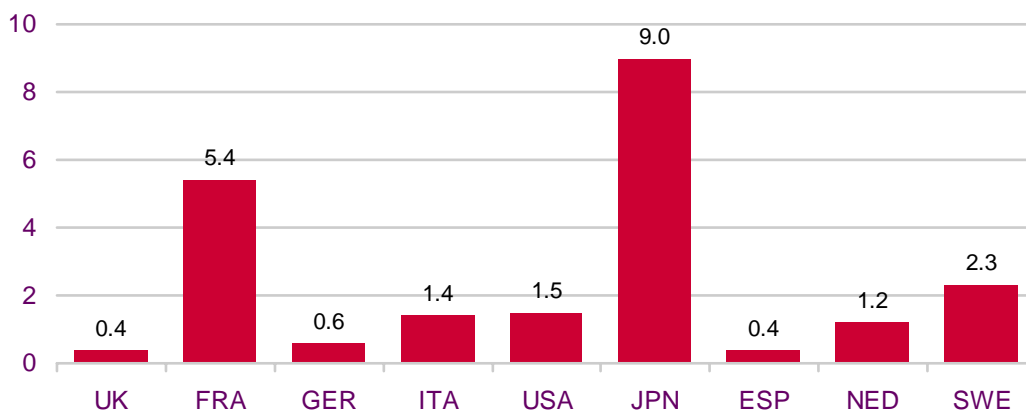
monthly rental for the service. Outgoing and incoming PSTN VoIP can be provided as one bundle or as separate services.

By the end of 2005, there were significant disparities in the take-up of VoIP among developed countries. Figure 2.2 shows the estimated number of people using paid-for VoIP services per 100 population for various countries at December 2005. It shows that Japan had the greatest level of VoIP penetration, with around one in eleven using the service, and that France also had a relatively high level of VoIP take-up – a reflection of the success of alternative operator Free in marketing VoIP services, and of France Telecom’s subsequent response.

By contrast, the UK had one of the lowest levels of paid-for VoIP service take-up among the countries analysed, with 0.4 VoIP users per 100 population. This can partly be explained by the strength of carrier pre-selection operators in the UK, which offer similarly low-priced call services using the PSTN. Ofcom research suggests that the overall number of people using VoIP in the UK, including those who use it for free PC-to-PC calls, is much higher, with an estimated 1.8 million users in May 2006.

Figure 2.2: VoIP penetration, December 2005

Subscribers per 100 population



Source: National regulators/OPTA/operators/IDATE

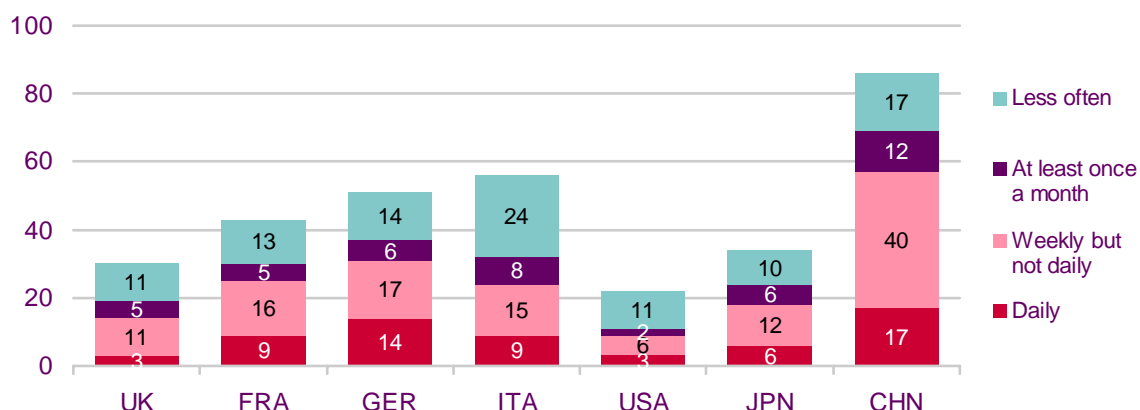
Note: The chart excludes PC-to-PC only VoIP call users

According to our online survey carried out in October 2006, take-up of all VoIP services (including PC-to-PC calls) by those who have broadband at home varies significantly between countries. Internet telephony is popular with broadband users in China, where 86% report having made VoIP calls, and of these almost two thirds said that they do so on a weekly basis. This is probably due to a very high share of early adopters in the sample, because of relatively low broadband penetration in the country, at 12%.

Germany had the second highest take-up, with 31% of respondents saying they use VoIP daily or weekly. Around a quarter of adults with broadband at home in France and Italy are weekly users of internet telephony, according to our survey. Perhaps unexpectedly, the US had the lowest share of VoIP users among its broadband users, with 9% reporting weekly use. The UK was second lowest, with 14%.

Figure 2.3: Use of the internet to make phone calls at home

% adults with broadband at home



Source: Ofcom research, fieldwork by Synovate in October 2006

Note: The chart includes PC-to-PC only VoIP call users

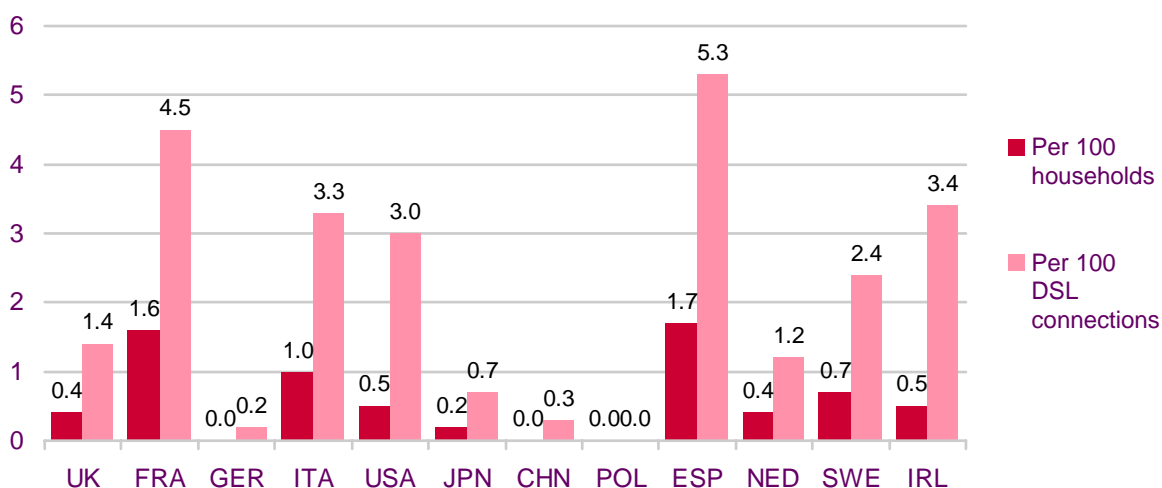
IPTV gains ground in Spain, France and Italy

IPTV (or TV over broadband) is a service that delivers TV programming to subscribers through their broadband connection rather than via traditional cable, satellite or terrestrial links. This allows far greater personalisation, customisation and interaction than other platforms.

IPTV is still an emerging application, and consequently take-up levels remain low. Of the countries analysed, Spain, France and Italy showed the highest penetration levels in 2005, while the UK ranked near the bottom (Figure 2.4).

Figure 2.4: IPTV penetration, December 2005

Subscriptions per 100 households and DSL connections



Source: Ofcom/operators/IDATE

According to Cullen International, in October 2006 France and Sweden had the largest number of commercial IPTV services with four TV over broadband services competing for subscribers in each country (France Telecom, Neuf Telecom, Free and Telecom Italia in France, and Telenor with Viasat, TeliaSonera, SkyCom in Sweden). Germany, Italy, Spain and the Netherlands all had two competing IPTV services, whereas in the UK there was only

one IPTV service, Homechoice (now owned by Tiscali), although BT is due to launch its *BT Vision TV* over broadband service before the end of 2006.

Broadband users embrace online services and applications

Our online survey of broadband users in seven countries highlights the fact that the internet is becoming an integral part of media consumption – and social life – in many countries around the world.

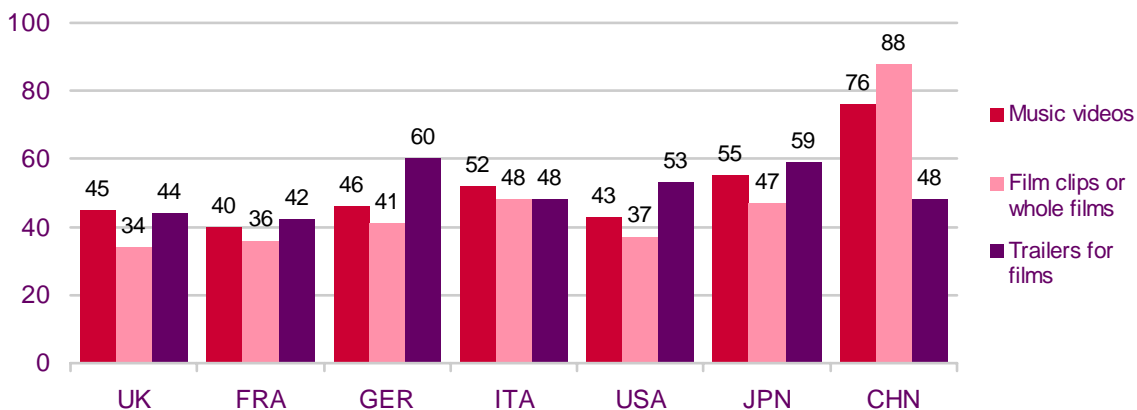
Figure 2.5 below shows the proportion of broadband users who have watched or downloaded music videos, film trailers and film content online. It shows that viewing of music videos, film clips and whole films is higher in China than elsewhere among our sample countries; this is possibly due to the large share of early adopters in the China sample.

In other countries, the proportion of broadband users who have watched online music video ranged from 40% (France) to 55% (Japan), those watching trailers ranged from 42% (France) to 60% (Germany), while the viewing of film clips was generally slightly lower, ranging between 34%-48%.

Figure 2.5: Use of online music videos and films

Have you ever watched or downloaded any of the following via your PC?

% of adults with broadband at home



Source: Ofcom research, fieldwork by Synovate in October 2006

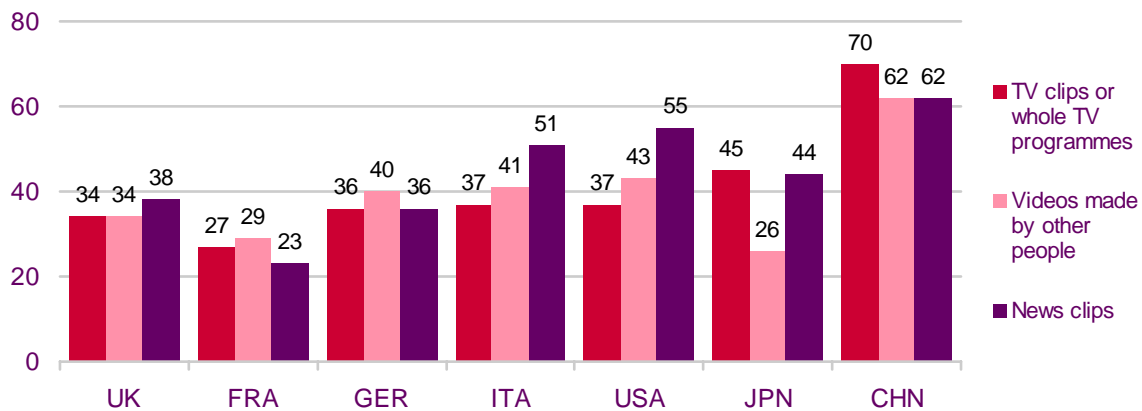
A revealing picture emerges when comparing the use of TV, news clips and user-generated content (Figure 2.6). The growing ease of producing and publishing video content online has, over the past year, spawned a similar revolution to that initiated by text- and image-based blogs several years ago. Hundreds of thousands of new videos made by ordinary online users are being uploaded daily to sites such as Google-owned *YouTube.com* (which is perhaps the most widely known video content sharing site, with over 70 million videos viewed each day).

Within most countries, the proportion of broadband users watching user-generated content online was similar to the proportion watching TV content online. Apart from China, where reported usage was again very high, watching TV content online ranged from 27% to 45%, while watching user-generated content ranged from 25% to 43%. The only countries where more people watched TV content online than user-generated content were China and Japan. The use of news clips also varies by country, from 23% of broadband users in France to 55% in the US, where it rated higher than TV and user-generated online content.

Figure 2.6: Use of online TV, news and user-generated content

Have you ever watched or downloaded any of the following via your PC?

% of adults with broadband at home



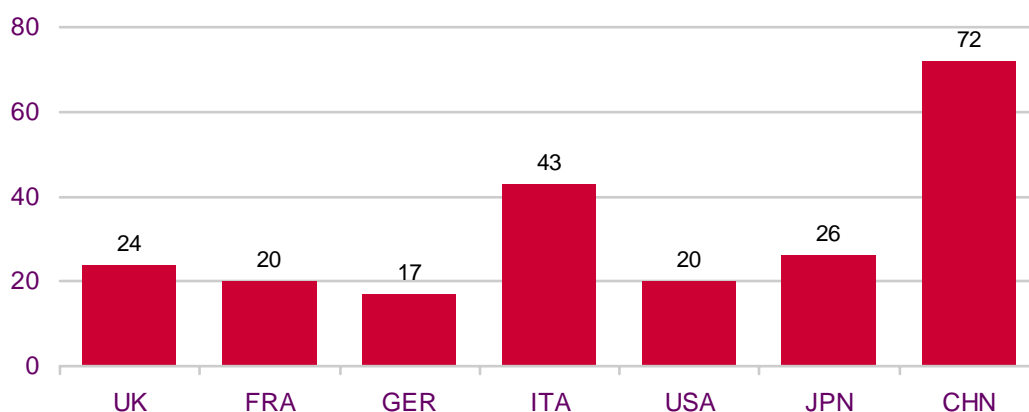
Source: Ofcom research, fieldwork by Synovate in October 2006

Our findings also indicate that sharing of files with other users is a relatively widespread activity among broadband users in the markets surveyed: a significant minority of adults with broadband at home participated in peer-to-peer file-sharing communities, also known as P2P networks. Such networks allow members to download files directly from each other's computers, typically music and video files. As would be expected, given the likely high proportion of early adopters, P2P membership is especially high in China, where 72% of users said they were members of online communities specifically designed to share files. Of the other countries researched, Italy also had high participation, at 43% of broadband users. Around one in four broadband users in Japan and the UK, and one in five in France, the US and Germany also said that they were members of file-sharing communities.

Figure 2.7: Membership of P2P file-sharing communities

Are you a member of an online community or network designed specifically to allow you to download other people's files and allow them to download yours?

% of adults with broadband at home



Source: Ofcom research, fieldwork by Synovate in October 2006

Online social networking is an international phenomenon

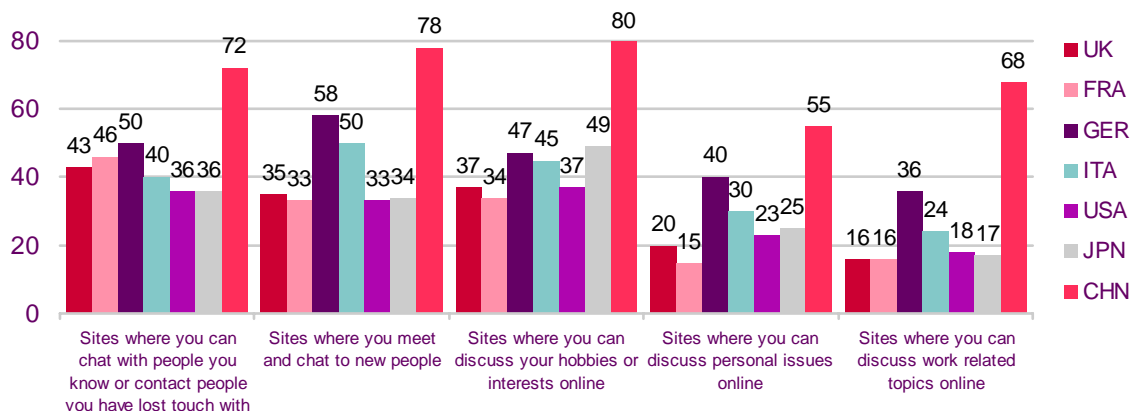
Our research on UK internet users published in the 2006 Communications Market report highlighted the widespread use of websites for interaction with people and community building – often referred to as ‘social networking websites’. We can see a similar picture among broadband users in the seven countries included in our international study (Figure 2.8). Here, again, take-up in China is the highest across our sample, with over 70% using the internet to keep up existing contacts and meet new people, while 8 in 10 broadband users have discussed their hobbies and interests online. Germany shows the second highest levels of use for all types of online social interaction, except for hobby- and interest-based sites, where Japan scores higher.

Overall, our findings suggest that the keeping up of existing contacts is the most popular type of social interaction online in France (where half of broadband users have visited such sites), and in the UK and Italy, where around four in ten have done so. Sites where one can discuss hobbies and interests rate first in China, Japan and the US, with 80%, 49% and 37% of broadband users respectively reporting having used such websites. Use of the internet to meet new people generally rates lower in most countries, except for Germany, where it is the top online social activity with 58% of adults with broadband at home reporting having used such sites, and Italy, with 50%.

Figure 2.8: Use of social networking websites

Have you ever used the following types of websites?

% of adults with broadband at home



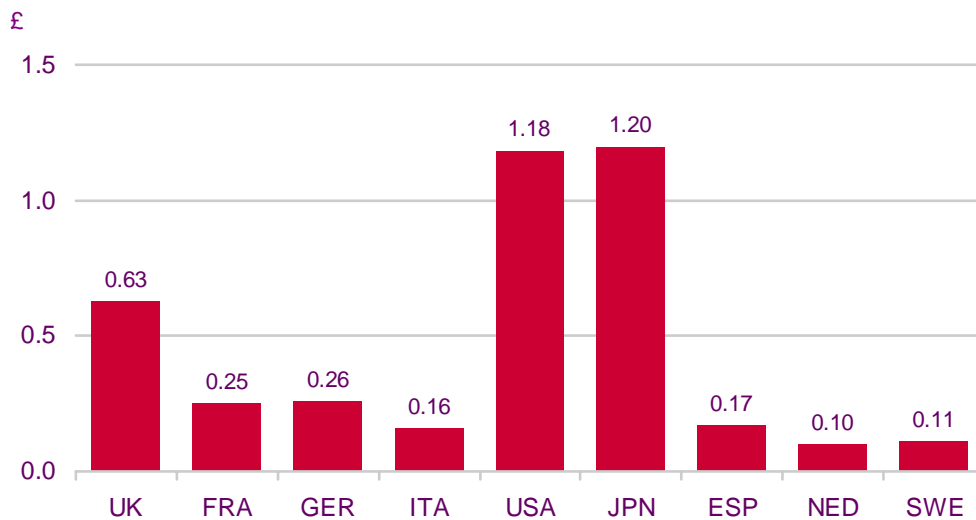
Source: Ofcom research, fieldwork by Synovate in October 2006

UK second only to US and Japan in digital audio downloads

Over the past two years, the way in which music is purchased has undergone a significant evolution. Consumers (especially young people) are increasingly supplementing or replacing CDs (and other ‘hard copy’ forms of music) with digital audio downloads via either broadband or mobile networks.

In terms of average digital download spend per head, the US and Japan were the leading nations in 2005 (Figure 2.9), with each person spending on average more than £1.18 over the year. On this measure, the UK ranked third among the countries analysed, with £0.63 average spend per head in 2005. The UK’s relatively strong position was largely due to the early launch of Apple’s iTunes download service, which was followed by competitive responses from a number of online and high street retailers.

Figure 2.9: Digital audio download sales per head, 2005



Source: IFPI/Ofcom

Note that these figures measure 'legal' paid-for downloads, and exclude unauthorised file-sharing downloads or downloads from unauthorised sites. Data on such types of download are very difficult to obtain, though there are some suggestions that the number of unauthorised downloads is still significantly greater than the number of tracks purchased lawfully.

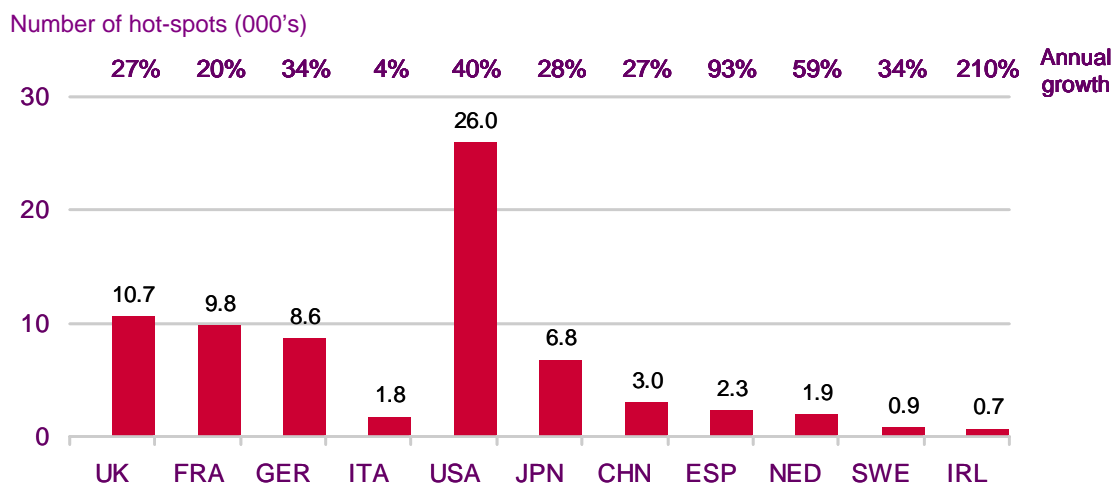
Wireless hot-spot coverage is growing fast

Increasingly, telecoms users in many countries can access broadband on the go using WiFi hotspots which have been rolled out by various operators around the world. Most major cities in the developed world are now covered by numerous points of access, and the last few years have seen the deployment of WiFi networks covering large areas of cities or whole cities in initiatives run by both municipalities and commercial operators.

As Figure 2.10 shows, by March 2006 the US had by far the highest number of hot-spots among our countries; according to Informa, the US commanded 94% of the North American market and around 25% of all hot-spots globally. In Europe, the UK had the highest number of hot-spots (10,700), followed by France and Germany.

Ireland and Spain experienced the highest growth in the number of hot-spots during 2005 (210% and 93% respectively), although both of these countries grew from a relatively low base. Roll-outs in Italy and France proceeded more slowly than in other countries during 2005.

Figure 2.10: Public wireless hot-spots by country, Q1 2006

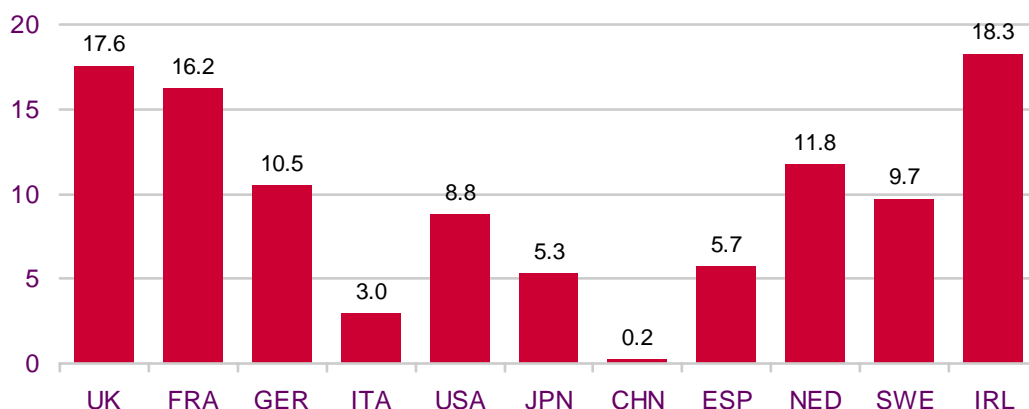


Source: Informa

An analysis of the number of hot-spots per 100,000 people allows a comparison of the level of deployment of public WiFi in different countries relative to their population (Figure 2.11). Here, we see that while the US led by far in terms of absolute number of hot-spots, the Republic of Ireland and the UK top the list in relative terms, with around 18 hot-spots per 100,000 population, closely followed by France, with 16. The US, at 8.8 per 100,000, matched the average number for our sample of countries. The deployment of public WiFi access points per 100 population in Japan was relatively low, perhaps because of the popularity of high-speed data services provided by mobile networks.

It is important to note, however, that the number of hot-spots relative to total population does not indicate availability or population coverage – such an analysis would need to be geographically-based, assessing the number of residents covered by hot-spots in specific areas in each country.

Figure 2.11: Public wireless hotspots per 100,000 population, Q1 2006



Source: Informa

Figure 2.12 below shows the largest hot-spot operator in each country in Q1 2006. According to Informa, Orange France was France and Europe’s largest operator, with 8,150 hot-spots in 2006 Q1, followed by The Cloud in the UK, with 6,600. An analysis of the number of hot-spots provided by the top operator as a share of total country hotspots is indicative of the degree of supply concentration in each WiFi market. The largest operator’s market share was greatest in France (83%), Germany (76%) and Ireland (75%), while the

US (29%) and Netherlands (37%) had a much lower level of WiFi provision controlled by the largest operator.

Figure 2.12: Largest wireless hot-spot operators by country, Q1 2006

Country	WiFi Operator	Commercial launch	Hotspots Q1 2006	Share of total hotspots in country
UK	The Cloud	May 2003	6,600	62%
France	Orange France	Feb 2003	8,150	83%
Germany	T-Mobile/T-Com	Nov 2002	6,550	76%
Italy	Tin.it	Mid-2003	771	44%
USA	Wayport	Jan 2000	7,682	29%
Japan	NNT West	Jun 2002	3,030	45%
China	China Mobile	Mar 2003	2,100	69%
Spain	Telefonica	Jun 2003	1,323	58%
Netherlands	KPN HubHop	May 2003	720	37%
Sweden	TeliaSonera HomeRun	Oct 1999	524	60%
Ireland	Eircom	Feb 2004	550	75%

Source: Informa

2.1.3 Regulatory developments

Although there are different nuances to the regulatory debate in individual countries based on the prevailing market structure and national legislative framework, several broad themes have received a high degree of attention during the last year. These include: international roaming and mobile call termination charges, spectrum management, net neutrality and next generation networks and access.

Mobile call termination

Mobile call termination is the service necessary for a network operator to connect a caller with a call recipient on a different network. If voice call termination, generally, was not available a network operator could only terminate calls to other customers on its own network. This service is referred to as wholesale because it is sold and purchased by network operators rather than retail customers.

Regulators in many EU Member States have found mobile network operators (MNOs) to have significant market power (SMP) for terminating calls on their networks, and have imposed a range of remedies including proposed charge controls.

International roaming charges

In February 2006 European Commissioner Viviane Reding announced proposals to address high inter-operator wholesale tariffs in international mobile roaming through a new EU regulation which could come into force as early as the second half of 2007. The regulation would cover retail tariffs to ensure that consumer prices reflected reduced costs. The EC has also proposed that EU consumers should not be charged for receiving calls to their mobile abroad.

The European Commission's proposals are opposed by the GSM Association, which argues that prices have already come down significantly as a result of competition in the sector (it reported a decrease of 22% in the last year). The GSM Association argues further that the EC proposals will prevent operators designing tailored packages to meet the needs of specific consumer groups.

Spectrum management

The effective and efficient management of electromagnetic spectrum is one of the key regulatory challenges across the world. One of the main priorities for the European Commission is a radical overhaul of policies related to spectrum management, including removing unnecessary constraints on the technology or service that can be provided in spectrum bands (technology and service neutrality), as well as the promotion of spectrum trading and the authorisation of pan-European services.

The proposals are intended to help the deployment of new technologies and deliver benefits to consumers by promoting innovation and competition. Some concern has been expressed that such a flexible approach may undermine the economies of scale presently enjoyed by network and handset manufacturers but supporters have argued that industry will still be able to deliver harmonisation where it will bring benefits.

In 2006, the European Commission proposed that a common approach to authorisations for pan-European services will help to promote the single market. However, there is currently some uncertainty as to what is meant by pan-European services. The Radio Spectrum Policy Group (RSPG), which is made up of representatives from Member States, has recently adopted an Opinion which considers several spectrum options for accommodating multimedia services (such as mobile TV) across Europe.

The European Commission's position is that market forces, technology and service neutrality should play an increasingly important role in the allocation of spectrum, in order to ensure its optimal use. As a result of the liberalisation of and trading in licences, consumers will benefit from new technologies and services being brought to market more quickly.

Japan plans to reallocate spectrum for specific services (e.g. mobile communications) and to compensate incumbent licence holders, and the US is using auctions and trading to assign new spectrum. Within the EU there is widespread support for the need for increased flexibility in spectrum management and the introduction of market mechanisms. However, details of how this new approach should be implemented (for example, in what spectrum bands and to what timescales) still need to be agreed.

The UK was one of the first countries in the EU to implement a flexible and market-based approach to spectrum management. However, a number of other Member States have now started to introduce trading in selected spectrum bands, and a few are also opening up bands, potentially allowing a wider range of services and technologies to potentially be offered.

Net neutrality

Net neutrality is the proposition that all content and applications must be treated equally on the internet, if innovation and customer choice are to be optimised. The net neutrality debate has arisen in response to the argument made recently in the US by internet service providers (ISPs) that they should not be charged different prices for the delivery of their content or applications by network operators. By contrast, electronic communications network providers believe that they should be able to charge different prices to operators for

different qualities of service in order to recover their infrastructure investment costs while supporting higher volumes of high quality services such as video.

In the US, a House Energy and Commerce subcommittee defeated a proposal which would have imposed extensive regulations on broadband providers and prevented them from offering higher-speed video services to partners or affiliates. The committee members rejected a 'net neutrality' amendment to a proposed piece of telecommunications legislation which had attracted support from companies including Amazon.com, eBay, Google, Microsoft and Yahoo. On 6 November, 2006, the Chairman of the Federal Trade Commission (FTC), Deborah Platt Majoras, expressed her preference for relying on a combination of existing laws, competition enforcement and user pressure to address complaints about concerns such as net neutrality.

The Dutch incumbent KPN took legal action against the Dutch government in summer 2006, alleging that its telecoms regulation was unfairly biased in favour of cable companies. The complaint asked for new regulations on cable operators. KPN's complaint was assessed and rejected by a local judge, at which time KPN stated that they intended to appeal the decision. In October 2006 the Dutch Parliament passed a motion calling on the Minister for Economic Affairs to introduce symmetric regulation for cable and telecoms by requiring cable companies to share networks with rivals, replicating local loop unbundling (LLU) in telecommunications.

The motion argued that free access to all networks for all service providers would benefit the further development of innovation and IT in the Netherlands. The Dutch government will consider now the Parliament's motion before coming to a decision on what form of reform is appropriate.

Next-generation networks

Next-generation networks (NGNs) is a generic term that includes both next-generation core and access networks. Investment in next-generation core networks focuses on replacing multiple legacy core networks with a single IP-based network for the provision of all services. Next-generation access networks relate to offering higher speed broadband services over local access networks. These may be delivered by a number of technologies, including fibre, cable, terrestrial fixed or mobile wireless services, satellite or upgrades to existing copper-based access networks.

The choice of whether to deploy either a next generation core or access network depends in part on communications providers' strategies. Next-generation core networks enable reductions in network operation and maintenance costs by moving to a single IP-based network. Next-generation access networks (NGAs) allow communications providers to offer increased bandwidth to end-users, including residential and small business customers. This may allow the launch of new services such as IPTV that could form the basis of additional revenue streams. The financial risks of launching a next generation access network will depend to a great extent on the level of demand that follows the rolling out of such a network.

The benefits of next generation networks, particularly next generation access, are emerging. Few operators are currently deploying both next-generation core and access networks simultaneously; however, a number of operators have announced the roll-out of particular NGNs or NGAs, including:

- **BT, C&W, Thus** and **ntl** are all deploying next-generation access core networks in the UK which may help them to reduce costs and expand their product ranges;

- **Telecom Italia** is migrating to an all-IP next-generation core network;
- in the US, both **Verizon** and **AT&T** are deploying fibre deeper into the access network, seeking to launch high-bandwidth broadband and video services in competition with US cable;
- **Deutsche Telekom** has announced its deployment of fibre-to-the-cabinet with VDSL to up to 50% of German homes;
- **KPN** has announced its intention to deploy fibre-to-the-cabinet, and is exploring the options for cost reduction from the removal of local exchanges; and
- in Japan a number of operators have deployed fibre access networks and **NTT** is considering its options with respect to a next-generation core network.

As these deployments emerge on a country-by-country basis, so the regulatory policy has varied by country depending on the specific characteristics of each market.

To date, the majority of regulatory debate on next-generation networks has centred on the issue of 'regulatory holidays'; a temporary suspension of regulation to allow market development for these investments. Within the US, the FCC has adopted a policy of forbearance from ex ante regulation with respect to fibre access networks. In this situation, once incumbent operators upgraded their access network to next-generation access, they would no longer be obliged to offer access to it to other operators. This is due to the competitive position within the US, with competing end-to-end infrastructure provision from both the incumbent telecom companies and the cable operators.

In Germany there has been a debate about the appropriateness of a 'regulatory holiday' for Deutsche Telekom's fibre-to-the-cabinet investment. Deutsche Telekom has called for time-limited forbearance on its fibre-to-the-cabinet with Very high bit-rate Digital Subscriber Line (VDSL) deployment. However, following discussions with the European Commission and further consideration, the German telecoms regulator (BNetzA) determined that VDSL services were to be included in its definition of the wholesale broadband access market in Germany. As a result, it determined that Deutsche Telekom would be required to provide third party access to a VDSL bitstream product. This decision hinged on BNetzA's conclusion that VDSL- and ADSL-based wholesale access are currently substitute services in the same economic market.

OPTA, the Dutch regulator, is currently consulting on the regulatory implications of KPN's announced deployment of fibre-to-the-cabinet, including a range of potential conditions to be applied to the phasing out of current exchange-based LLU products. At the same time, KPN has proposed to offer voluntary sub-loop unbundling and a bitstream access product for its fibre-to-the-cabinet deployment. OPTA also intends to conduct market reviews for wholesale local access and wholesale broadband access, and to assess to which market the backhaul from sub-loop unbundling locations belongs.

Other countries have adopted policies which aim to increase the level of end-to-end competition in the provision of next-generation networks. One example is Japan, with a regulatory policy focused on removing barriers to the deployment of competing end-to-end access infrastructure. The issue of access to the incumbent's fibre access network is also currently being discussed in Japan.

Within the UK, the majority of regulatory discussion has focused on the impact of BT's 21st Century Network next-generation core network investment and has resulted in the formation of NGNuk, an independent NGN industry body, which aims to create an improved framework

for industry engagement. It seeks to do so by providing a set of guiding principles and an implementation framework for an interconnected NGN future for the UK, including interconnection between PSTN replacement NGNs, IP-based mobile networks, VOIP operators, and other relevant communications networks and service developments .

At the European level, there has been an ongoing debate on regulatory holidays and emerging markets within the European Framework Review, including next-generation network deployments. In June 2006, Commissioner Reding outlined the European Commission's position, stating that the response to the challenges faced by operators from the deployment of next generation infrastructure must be new business models as opposed to regulatory protection. Within this speech, Commissioner Reding also indicated the risk that regulatory holidays may pose to consumers, raising the possibility of higher prices and less choice, and she also recently stated that such holidays should not be supported.

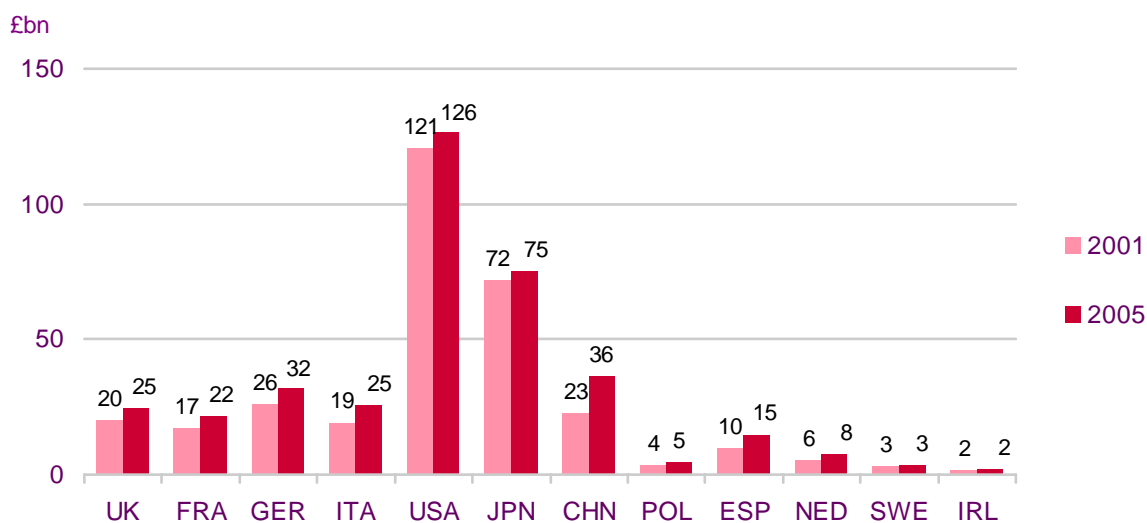
2.2 The telecoms industry

2.2.1 Total telecoms revenue has risen slowly in most countries...

Over the five years to 2005, total telecoms revenue grew broadly in line with inflation in most of the countries in our analysis. Figure 2.13 below shows that revenue in both the US and Japan exceeded that of all other countries in our analysis by a wide margin. Indeed, in 2005 US telecoms revenue exceeded that of the UK, France, Germany, Italy and China combined.

Between 2001 and 2005 China had the fastest growth in telecoms service revenues, with turnover increasing by over 60% to £36bn. Spain also had impressive revenue growth over the period, a large proportion of which came from the mobile sector.

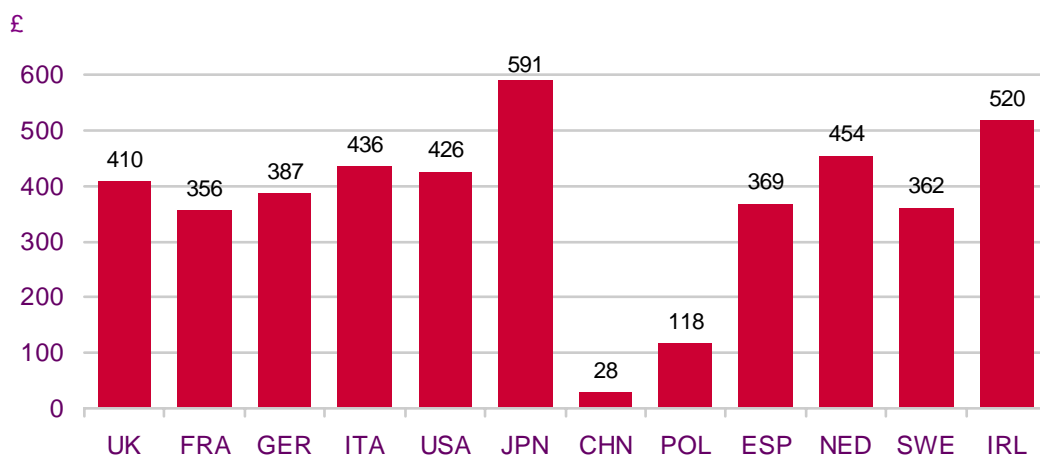
Figure 2.13: Telecoms service revenue 2001/2005



Source: IDATE / Estimates based on operator and regulator data/Ofcom research
 Note: Revenue excludes corporate data services and dial-up internet

In 2005, Japan had the highest per capita telecoms spend with an average £592 over the year, followed by Ireland with £520. (Figure 2.14). Average spend in the US and the other European countries studied all fell into the £350-£450 per year range, except for Poland which was significantly lower at £118 a year. China had the lowest per capita spend at £28 a year. It should be noted that average spend cannot be used as a proxy for prices in each country, as it does not take usage levels into account.

Figure 2.14: Telecoms service revenue per capita, 2005

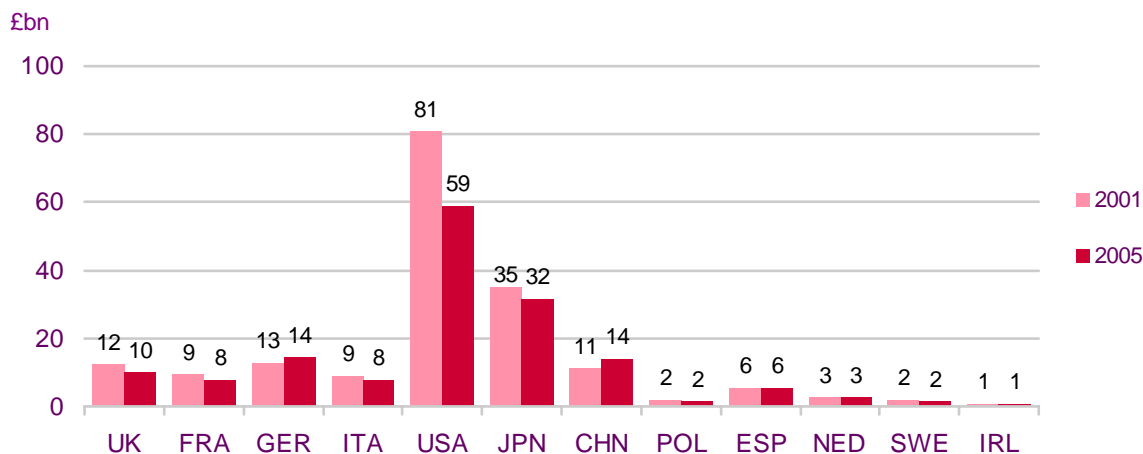


Source: IDATE / Estimates based on operator and regulator data/Ofcom research
 Note: Revenue excludes corporate data services and dial-up internet; excludes VAT

2.2.2 ...but fixed-line voice revenue has declined...

Revenue from fixed-line voice was relatively flat across most countries over the five years to 2005, although there was a gentle downward trend. The major exception was the US, where high recent growth of mobile contributed to a steep decline in fixed-line voice revenues (over 25%). Of the countries studied, only China and Germany experienced growth in fixed voice between 2001 and 2005; in China this is despite the fact that many new telecoms customers are taking up mobile services in preference to fixed.

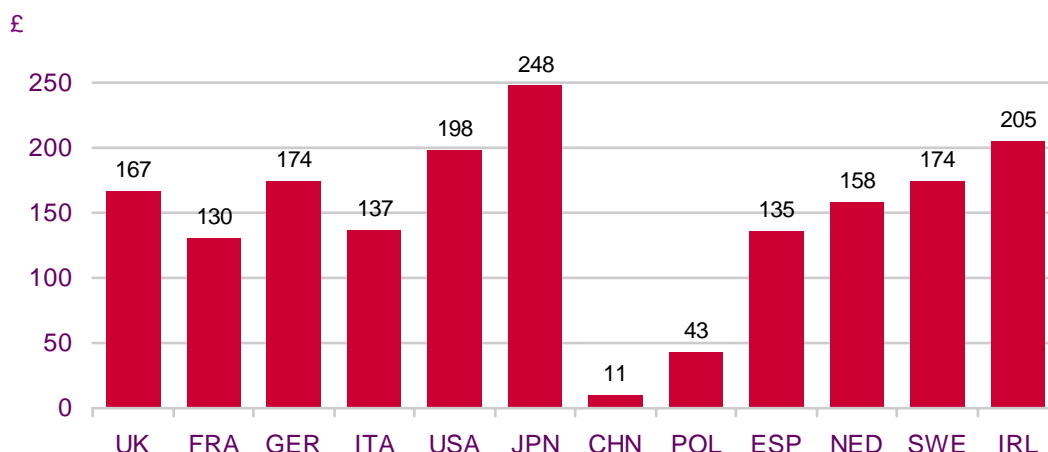
Figure 2.15: Fixed-line voice revenue



Source: IDATE / Estimates based on operator and regulator data/Ofcom research

Although, despite recent revenue falls, the US had the largest fixed voice spend in absolute terms in 2005 (Figure 2.16), on a per-capita basis Japan and the Republic of Ireland had a higher fixed spend with £248 and £205 respectively, compared to the US's £198. The lowest per capita spends were in China (£11 a year) and Poland (£43 a year).

Figure 2.16: Fixed-line voice revenue per capita, 2005



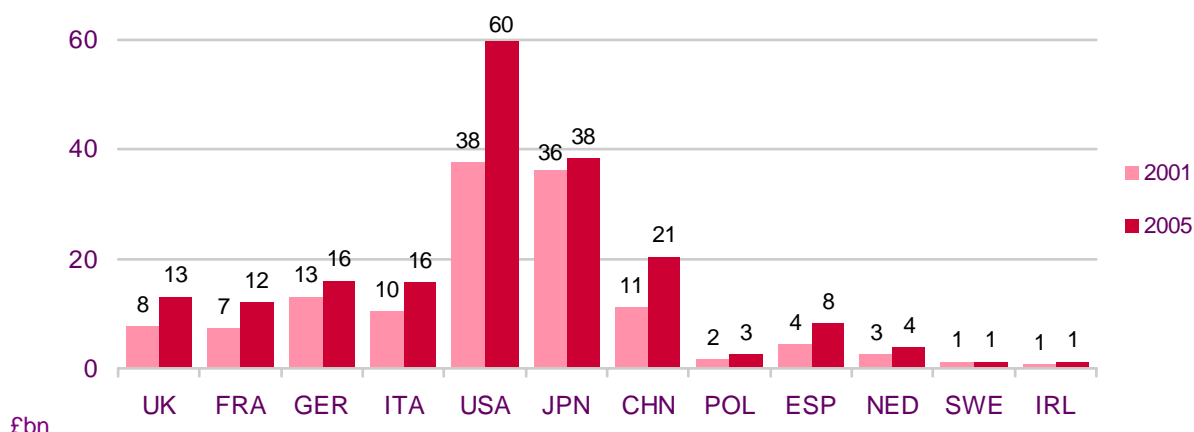
Source: IDATE / Estimates based on operator and regulator data/Ofcom research

2.2.3 ...while mobile revenue has grown sharply

Figure 2.17 below shows that mobile revenue grew strongly across most countries over the four years to 2005. The US showed significant growth, with mobile revenue rising by more than 50% over the period; however, mobile revenues grew at the fastest rate in China, with revenues in 2005 being almost double those in 2001. As mentioned previously, China's mobile communications industry appears to have benefited from the widespread bypassing of fixed-line connectivity among Chinese consumers in favour of an immediate leap to mobile. Revenue growth among the countries in question was directly related to market maturity, with growth being highest in those with a rapidly growing subscriber base and slower in those markets with high mobile penetration.

An analysis of 2005 mobile revenue shows that, once again, the US had the highest revenue in 2005 with £60bn, followed by Japan with £38bn. China occupied a clear third position in the list with mobile revenues of £21bn in 2005.

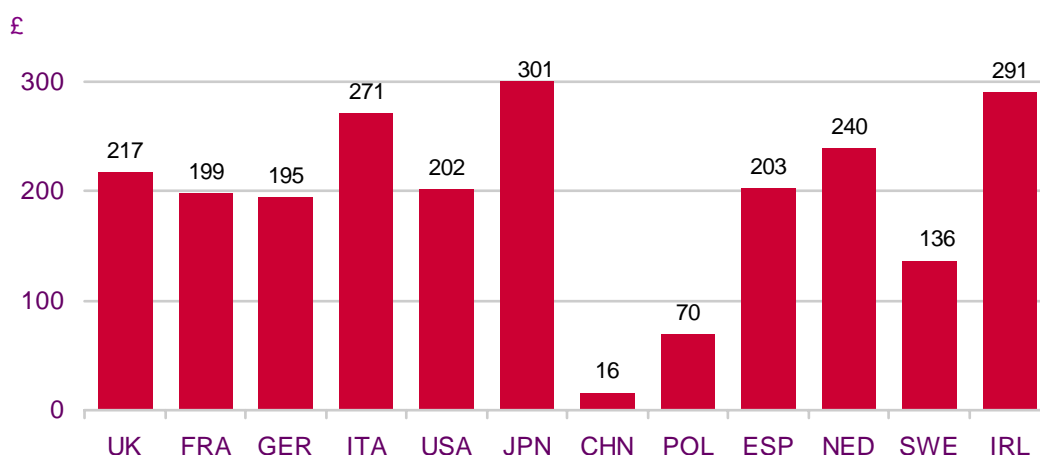
Figure 2.17: Mobile service revenue



Source: IDATE / Estimates based on operator and regulator data/Ofcom research

Japan has the highest per capita mobile service spend at over £301 a year, compared to £16 a year in China, which had the lowest average mobile spend (Figure 2.18). Average spend per capita in the UK was £217 compared to £167 for fixed voice services.

Figure 2.18: Mobile service revenue per capita, 2005

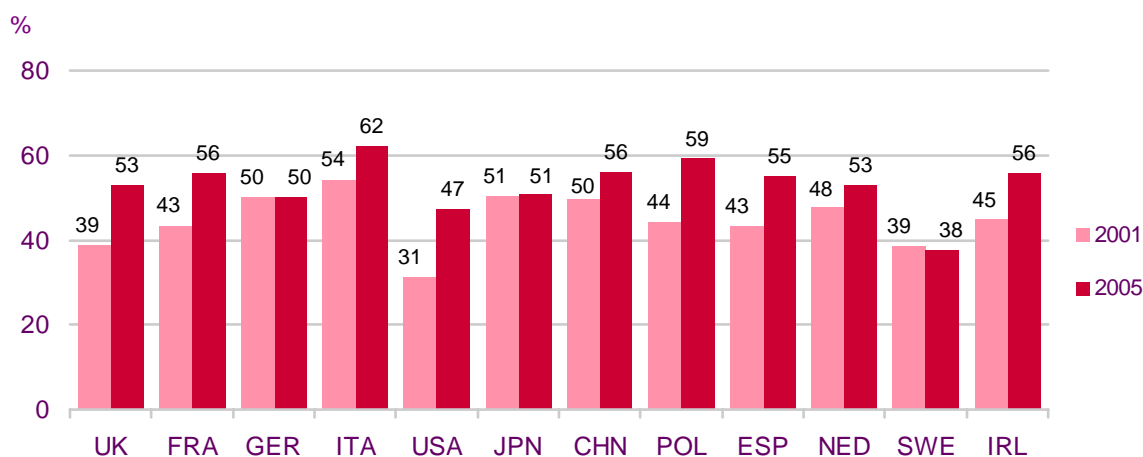


Source: IDATE / Estimates based on operator and regulator data/Ofcom research

2.2.4 Mobile forms an ever-increasing proportion of telecoms revenue

Comparing mobile revenue to total telecoms revenue for each country shows the relative strength of mobile in Italy, where it accounted for around 62% of all telecoms revenue in 2005 (Figure 2.19). Most countries in our list have followed a similar pattern of growth under this measure, with the exceptions being Japan and Germany, where mobile remained at around 50% of total telecoms revenue during the period, and Sweden, where it fell slightly (as a result of earlier mobile market maturity coupled with falling prices).

Figure 2.19: Mobile service revenue as proportion of total telecoms revenue

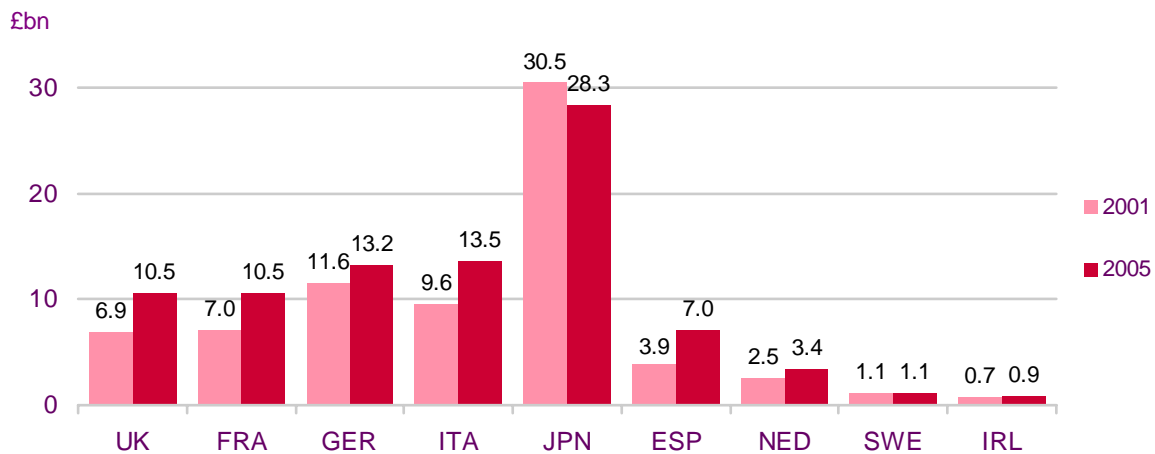


Source: IDATE / estimates based on operator and regulator data/Ofcom research

2.2.5 Within mobile, voice revenue grows in most countries...

Interestingly, when mobile services are split into their voice and data elements, some of these effects become even more pronounced. Figure 2.20 below shows that Japanese mobile voice revenue declined marginally over the five years to 2005. This can be explained by the combination of a near-saturated mobile market (even in 2001), strong price competition between the three Japanese mobile operators, and a near-zero-inflation economic environment. By contrast, mobile voice revenue rose steadily during this period in all the other countries in our analysis; however, much or all of this growth can be attributed to subscriber increases, and increases in average usage, rather than rising retail prices.

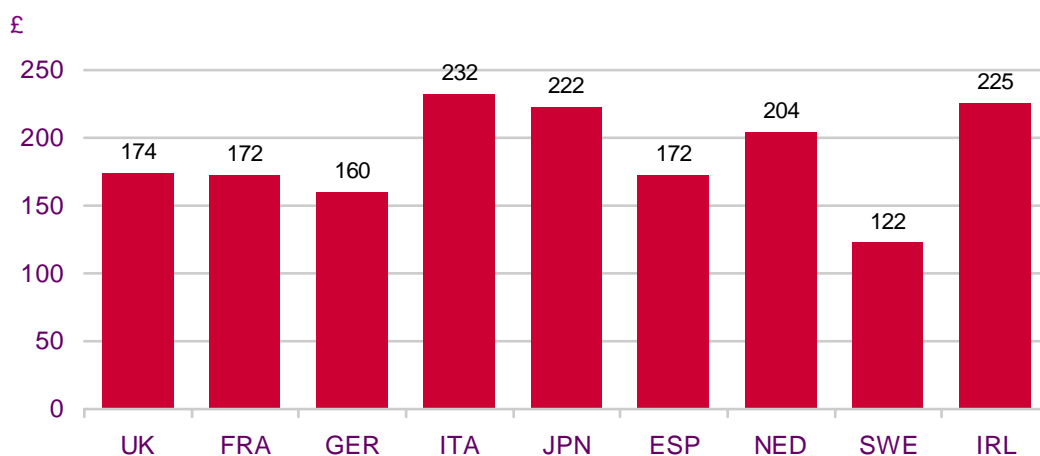
Figure 2.20: Mobile voice service revenue



Source: IDATE / estimates based on operator and regulator data/Ofcom research

On a per capita basis, Italy had the highest mobile voice spend per person in 2005 with £232, followed closely by Ireland and Japan (Figure 2.21). Of the countries for which data was available Sweden had the lowest average mobile voice spend per person, again as a result of falling prices.

Figure 2.21: Mobile voice service revenue per capita, 2005

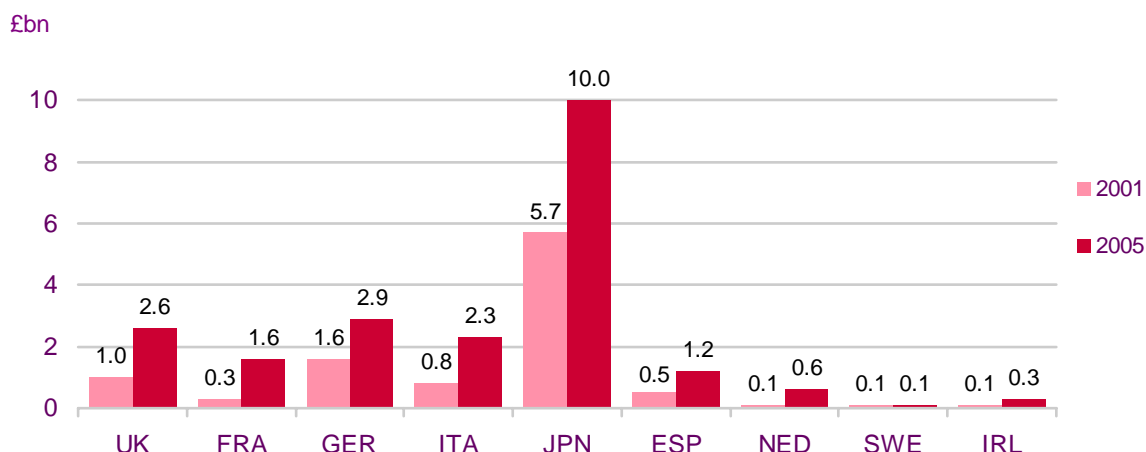


Source: IDATE / estimates based on operator and regulator data/Ofcom research

2.2.6 ...while mobile data revenue has grown at a faster rate...

In contrast, revenue from mobile data services (including SMS, MMS, mobile internet and other mobile content) rose across the board between 2001 and 2005 (Figure 2.22). Japan saw a dramatic rise in this revenue stream, as more and more Japanese consumers adopted 2.5G and 3G. In most other countries, the bulk of the increase in data service revenue over this period came from the SMS market.

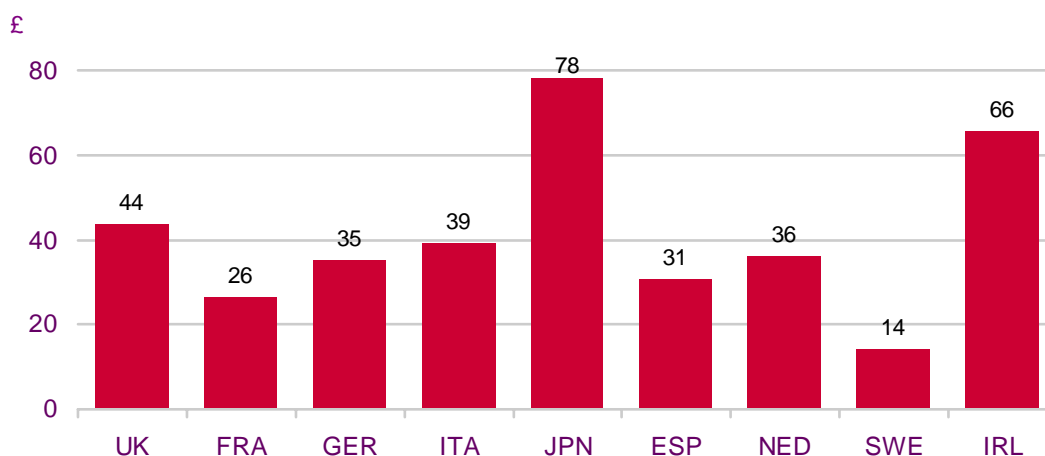
Figure 2.22: Mobile data service revenue



Source: IDATE / estimates based on operator and regulator data/Ofcom research

On a per capita basis, of the countries for which mobile data spend information was available, Japan had the highest average spend, followed by Ireland and the UK. Sweden and France had the lowest mobile data spends in 2005 (Figure 2.23).

Figure 2.23: Mobile data service revenue per capita, 2005

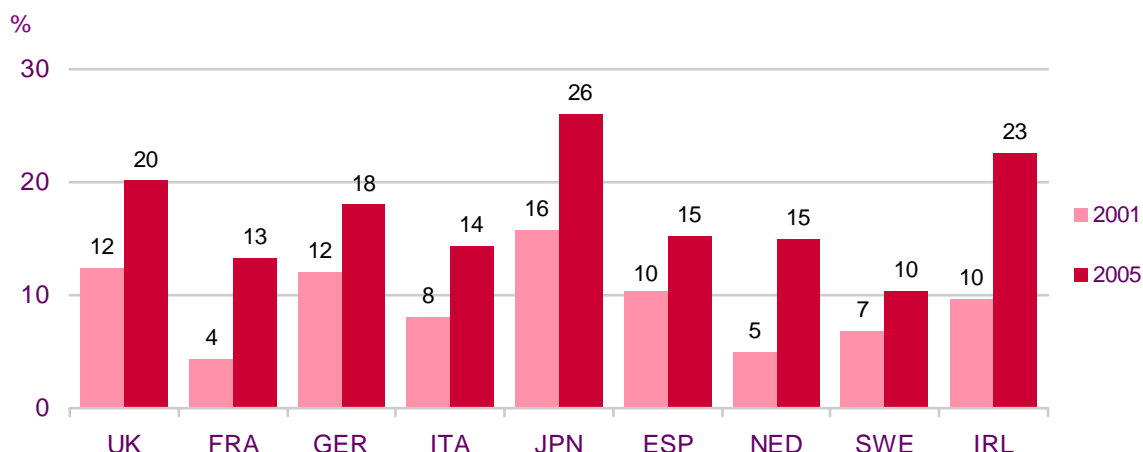


Source: IDATE / estimates based on operator and regulator data/Ofcom research

2.2.7 ...meaning that data forms an increasing proportion of mobile revenue

Figure 2.24 below shows mobile data service revenue as a proportion of total mobile revenue. It indicates that all countries saw mobile data form an increasingly significant portion of their total mobile revenue over the five years to 2006. In Japan, by 2005, mobile data services comprised over 25% of all mobile revenue, closely followed by Ireland with 23% and the UK with 20%. All other countries were sitting in the 10%-18% range.

Figure 2.24: Mobile data service revenue as proportion of total mobile revenue

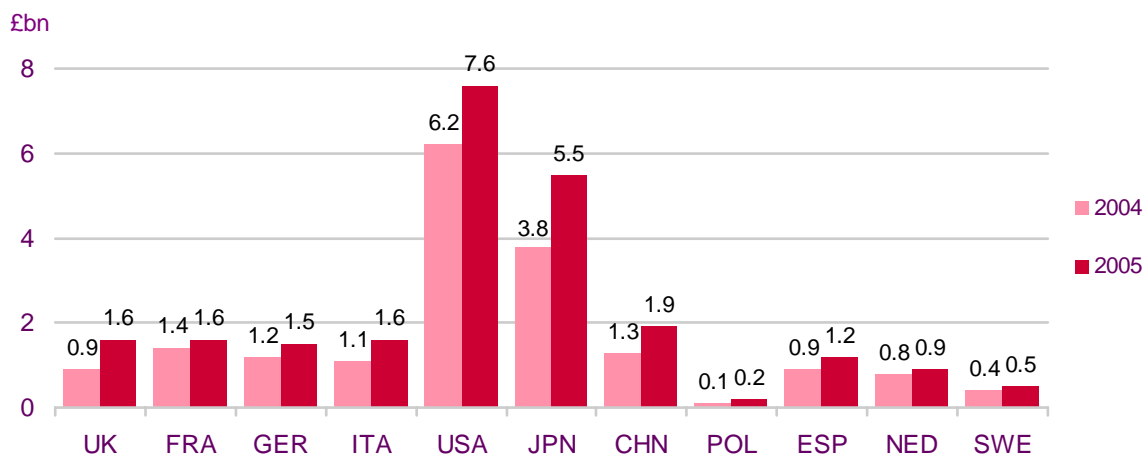


Source: IDATE / estimates based on operator and regulator data/Ofcom research

2.2.8 Broadband revenue rose strongly between 2004 and 2005

Broadband revenue rose steeply in all countries between 2004 and 2005 (Figure 2.25). The UK, for example, witnessed over 60% year-on-year growth, and even Japan (a relatively mature broadband market) saw revenue grow by 40%. This growth was almost entirely due to the rapid growth in broadband connections, despite general falls in retail monthly subscription prices in all countries (although many users upgraded their downlink speeds over the same period).

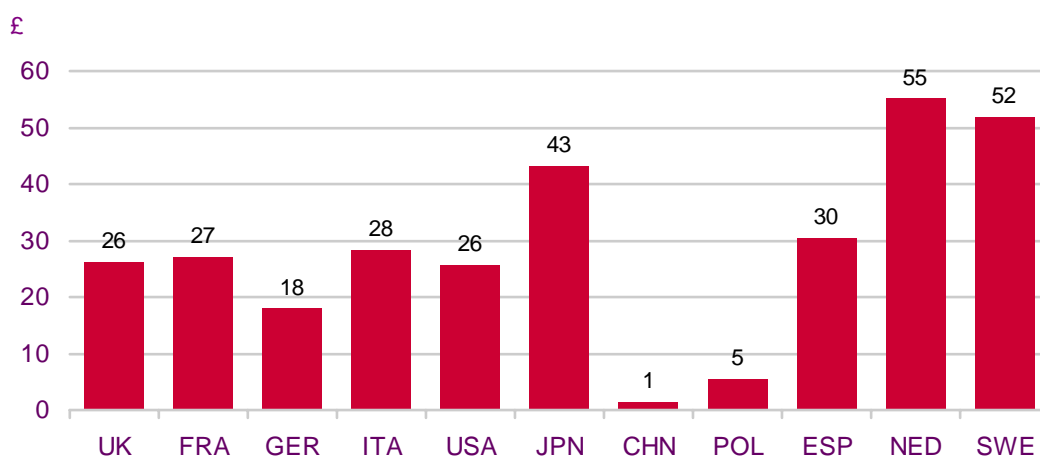
Figure 2.25: Broadband revenue



Source: IDATE / estimates based on operator and regulator data/Ofcom research

Analysis of 2005 broadband revenue shows that once again the US and Japan were significantly ahead of the other countries in our analysis (Figure 2.25); however, on a per capita basis the highest spends were in the Netherlands and Sweden (Figure 2.26).

Figure 2.26: Broadband revenue per capita, 2005



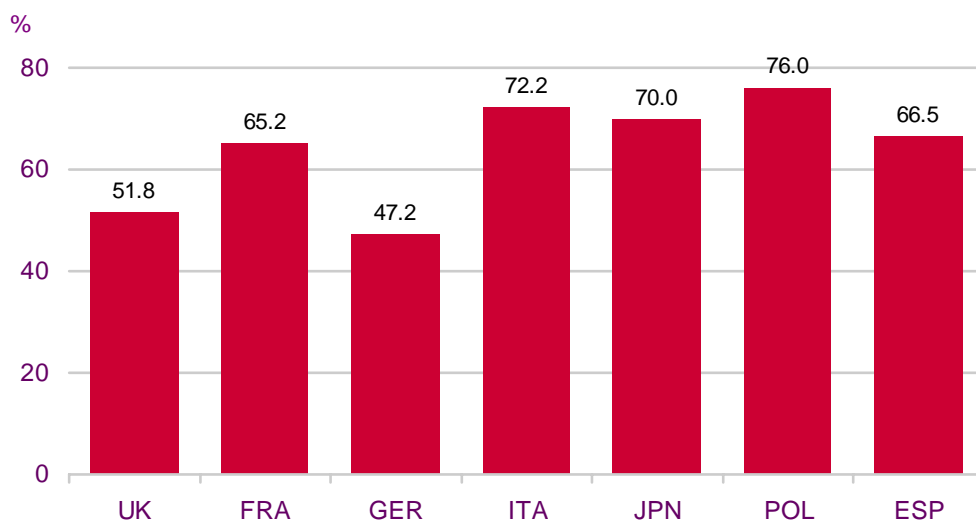
Source: IDATE / estimates based on operator and regulator data/Ofcom research

2.2.9 Germany and UK have greatest diversity of fixed-line supply

Most fixed-line incumbents lost significant market share to alternative operators between 1995 and 2005. Competition came from a mixture of facilities-based 'altnet' operators, and, more recently, through alternative service providers which use the incumbent's network to provide voice services. Additionally, new local loop unbundling (LLU) operators have begun to take control of local exchange lines from the incumbents to offer network-based services.

Figure 2.27 shows that Germany has seen the most competition to the incumbent (Deutsche Telekom), with the UK (BT) not far behind. By contrast, incumbents in France, Italy and Japan (France Telecom, Telecom Italia and NTT respectively) have maintained a higher market share. The UK was one of the first countries to deregulate the fixed-line market and introduce fixed-line competition at a retail level (during the mid 1980s), with other EU nations following similar paths during the 1990s. Note that the US is not included in this analysis, owing to the fragmented structure of its telecoms market and the presence of local monopolies/duopolies.

Figure 2.27: Incumbent market share of fixed-line volumes, 2005



Source: IDATE / National regulators/OECD/Ofcom research

2.2.10 The UK has one of the most diversified mobile markets

In mobile, the Herfindahl-Herschman Index (HHI) is often used to measure the level of concentration in the markets in terms of subscriber market shares of different operators.

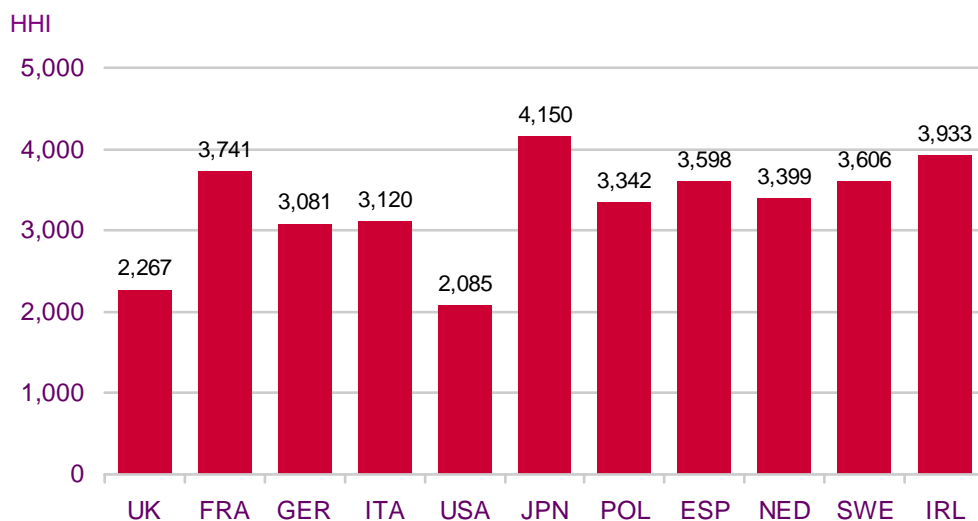
Herfindahl-Hirschman Index of market concentration

The Herfindahl-Hirschman Index (HHI) is a measure of the size of firms in relation to the size of the industry as a whole and is an indicator of the level of competition in a market. The HHI is defined as the sum of the squares of the market shares of each individual firm. As such, it can range from 0 (for a market with a large number of firms with equal market share) to 10,000 for a monopoly.

Decreases in HHI generally indicate a loss of pricing power and an increase in competition, whereas increases imply the opposite. In the UK the Office of Fair Trading (OFT) is likely to regard a market with an HHI in excess of 1,800 as highly concentrated and a market with an HHI in excess of 1,000 as concentrated.

Figure 2.28 below shows that the US has the least concentrated mobile market in terms of subscribers, owing to the fragmented nature of the US cellular market (although continuing consolidation will re-concentrate the market to an extent). On the other hand, Japan had the most concentrated mobile market. The data show that the UK had the second most diversified mobile market after the US, reflecting the relatively equal strength of the main network operators, and the presence of a growing fifth network operator.

Figure 2.28: Herfindahl-Herschman Index - mobile subscribers

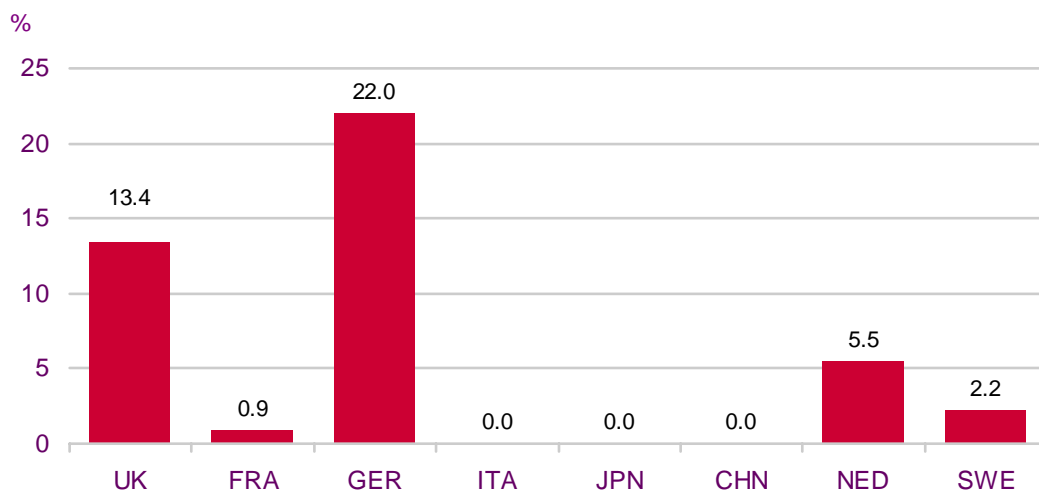


Source: IDATE / National regulators/OECD/Ofcom research
 Note: Estimate for Germany includes resellers

2.2.11 MVNOs have significant market share in Germany and UK

The relative strength of MVNOs is shown in Figure 2.29 below. The UK and Germany had by far the most developed MVNO markets by the end of 2005, and of the remaining countries (the Netherlands, Sweden and France) had some MVNO presence. The presence and strength of MVNOs in any given market is reflective of a number of factors, including general market conditions, the regulatory environment, and the strategies of the network operators. In the UK, for example, T-Mobile struck a deal with Virgin Mobile for access to its 2G network as long ago as 1999, while in Italy the network operators not opened their networks to competitors. Note that we have no data for the US, where MVNOs (chiefly Virgin Mobile) have recently been gaining share.

Figure 2.29: MVNO share of retail subscribers, 2005

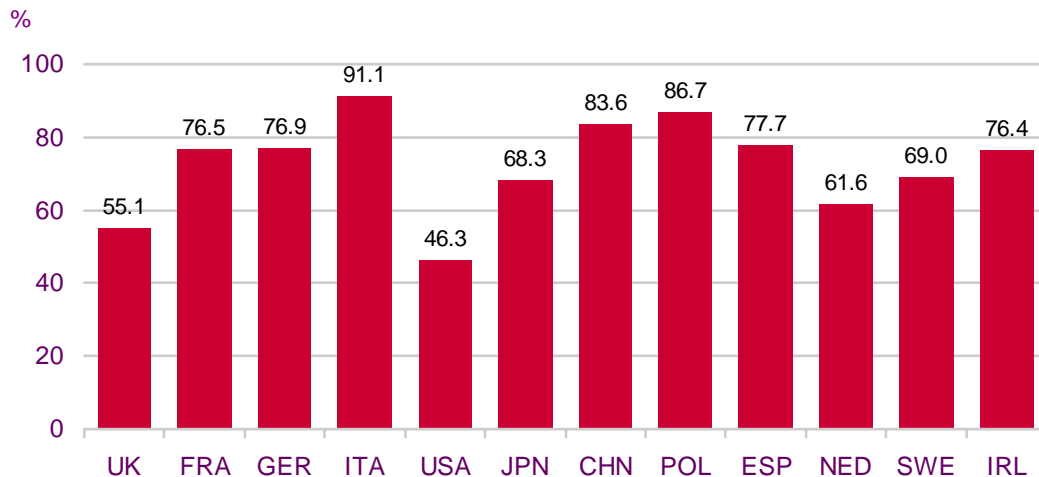


Source: IDATE / National regulators/OECD/Ofcom research

2.2.12 Broadband market concentration differs widely between countries

In broadband, there is again a marked difference between the countries included in our analysis. Figure 2.30 below shows that the US and the UK had a relatively fragmented broadband market at the end of 2005, while Italy and China were dominated by their incumbents' ISPs. In the UK, BT Retail, ntl and AOL accounted for around 55% of all connections at the end of 2005; however, we estimate that the UK's top three broadband operators' share increased to over 62% in June 2006, following the merger of ntl and Telewest.

Figure 2.30: Retail subscription share of top three broadband operators, 2005

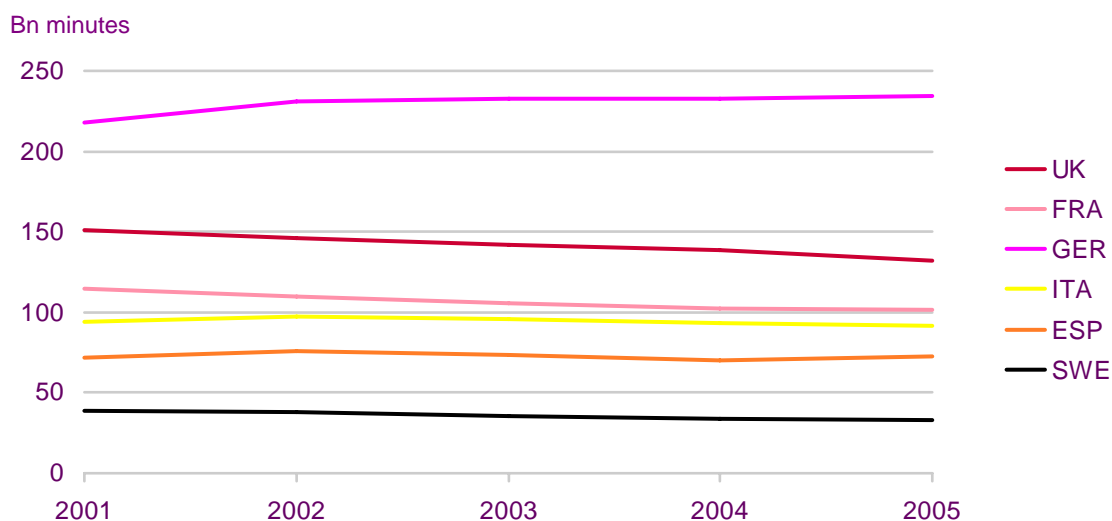


Source: IDATE / National regulators/OECD/Ofcom research

2.2.13 Total fixed-line voice volumes remain constant

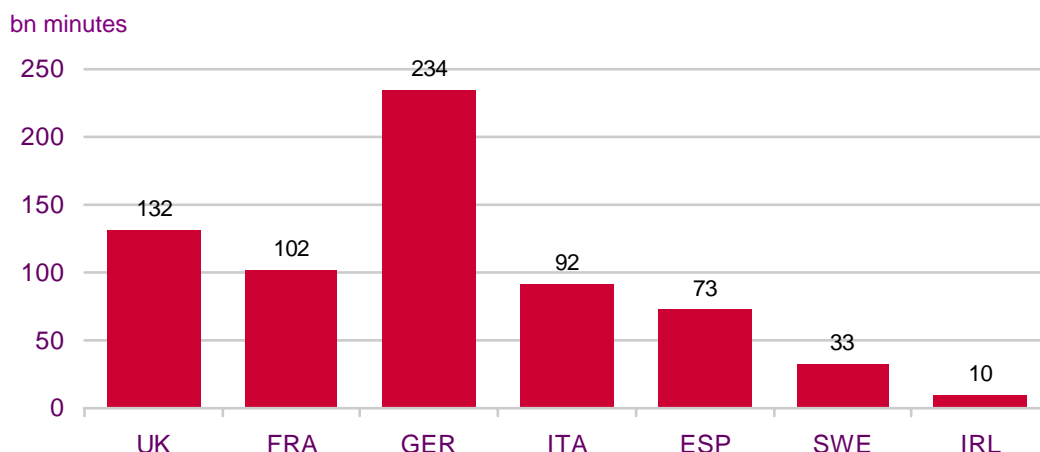
Fixed-line voice call volumes remained broadly flat between 2001 and 2005 across the countries where we have data (Figure 2.31). When considered against total fixed-line voice revenues, this suggests that prices fell over the same period.

Figure 2.31: Fixed-line voice volumes



Source: IDATE / National regulators/Ofcom research

Figure 2.32: Fixed-line voice volumes, 2005

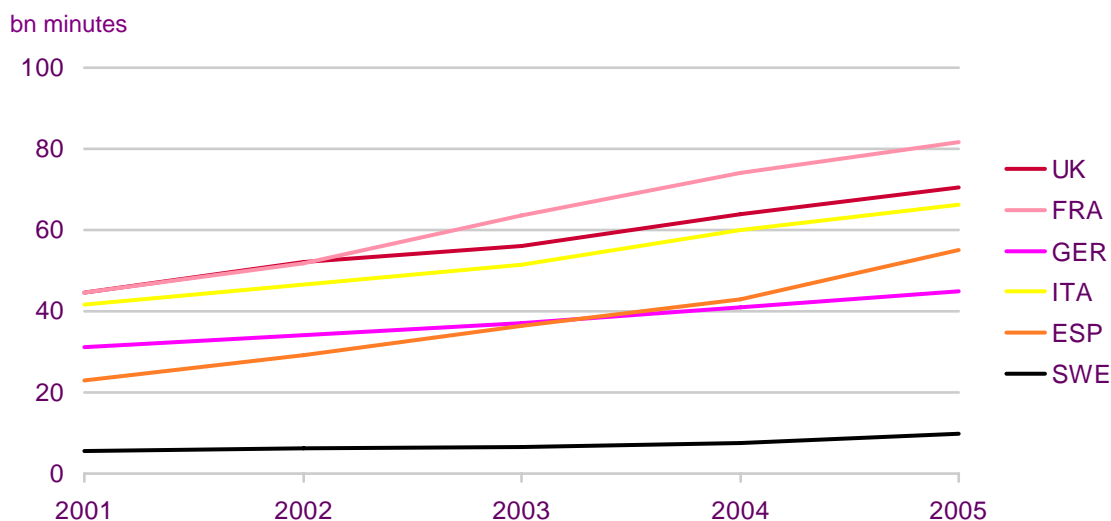


Source: IDATE / National regulators/Ofcom research

2.2.14 Total volume of mobile calls grows rapidly since 2001

By contrast, mobile voice call volumes grew rapidly across all the countries for which we have data (Figure 2.33). This is due to a combination of continued subscriber growth in these countries, coupled with increased usage volumes among existing subscribers. Of the countries analysed, Sweden has shown the lowest proportionate growth, probably owing to the fact that mobile was already a mature and widely-used technology by 2001.

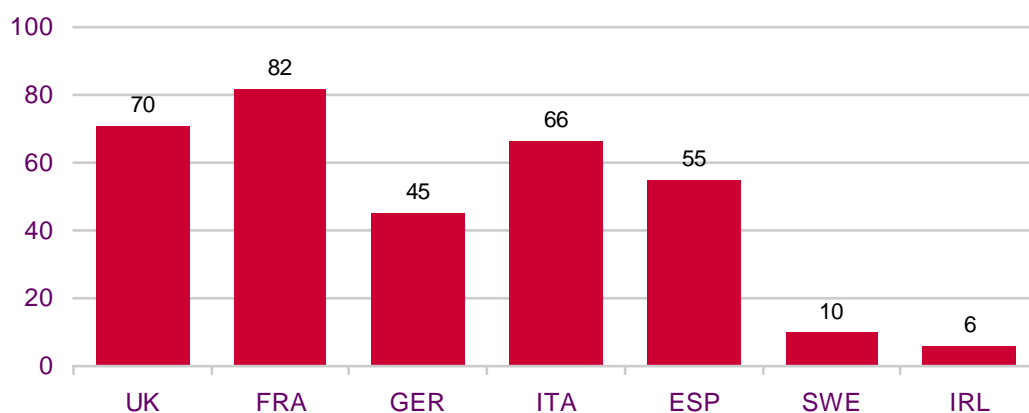
Figure 2.33: Mobile voice volumes



Source: IDATE / National regulators/Ofcom research

Figure 2.34: Mobile voice volumes, 2005

bn minutes

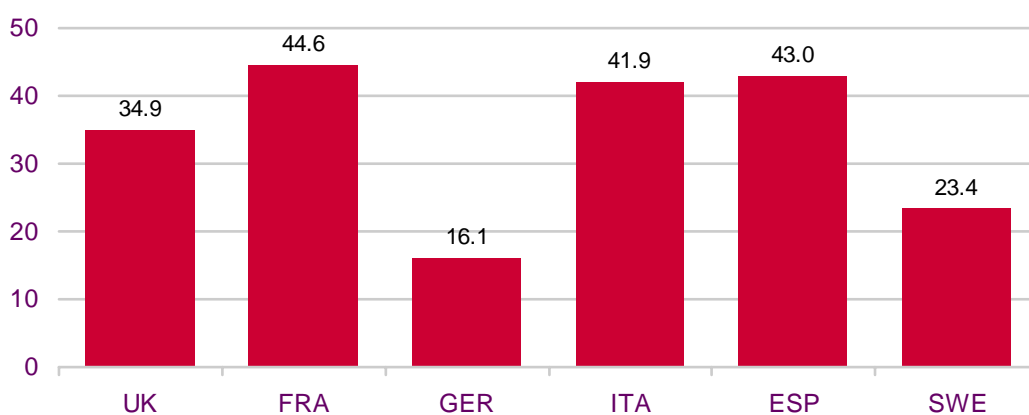


Source: IDATE / National regulators/Ofcom research

Of the countries for which data was available, mobile made up the highest proportion of total fixed and mobile voice calls in France, Spain and Italy – where it accounted for 40-45% of all voice calls. In the UK, mobile made up just over a third of total voice calls, while in Germany only 16% of voice calls originated on mobile networks in 2005.

Figure 2.35: Mobile as a proportion of all voice call volumes, 2005

%



Source: IDATE / National regulators/Ofcom research

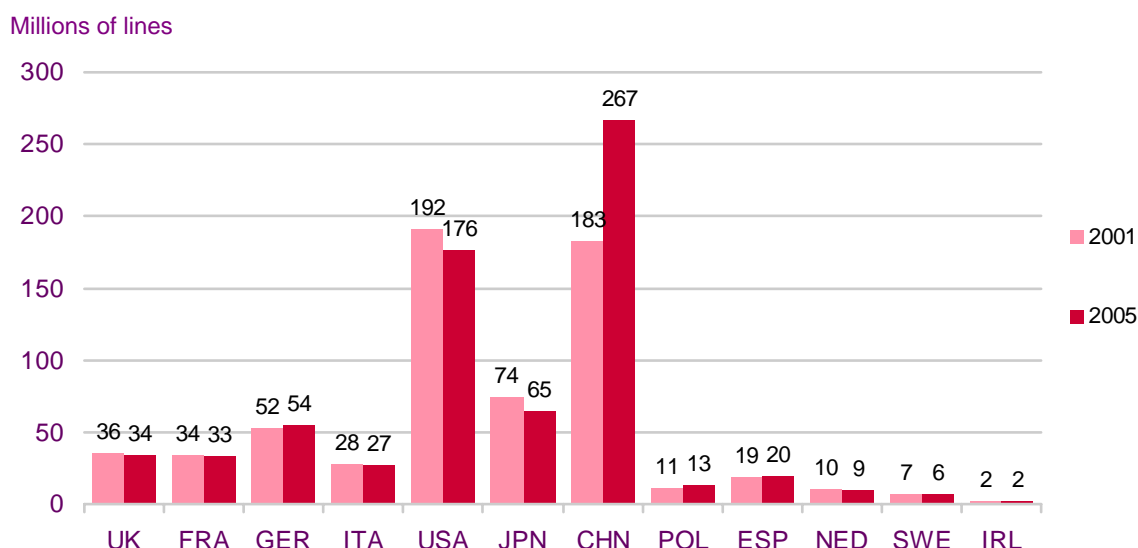
2.3 The telecoms user

2.3.1 China grows to first place in fixed lines

In general, the number of fixed lines has been slowly declining in the five years since 2001 (Figure 2.36). The notable exception to this trend is China, where the number of analogue (PSTN) lines increased by almost 50% over this period. This contradiction can be explained by China's relatively low installed base of PSTN lines before 2000. The other countries where the number of fixed lines grew were Poland (a 15% increase), Germany (4%), Republic of Ireland and Spain (both 6%).

The US showed the largest absolute decline in fixed lines between 2001 and 2005 – down by 15.3m or 8%, followed by Japan (down 8.9m or 12%) and the UK (down 1.6m or 4%). By the end of 2005, China had the most exchange lines of any of the countries in our analysis (267 million), followed by the US (176 million).

Figure 2.36: Total fixed exchange lines (PSTN and ISDN)



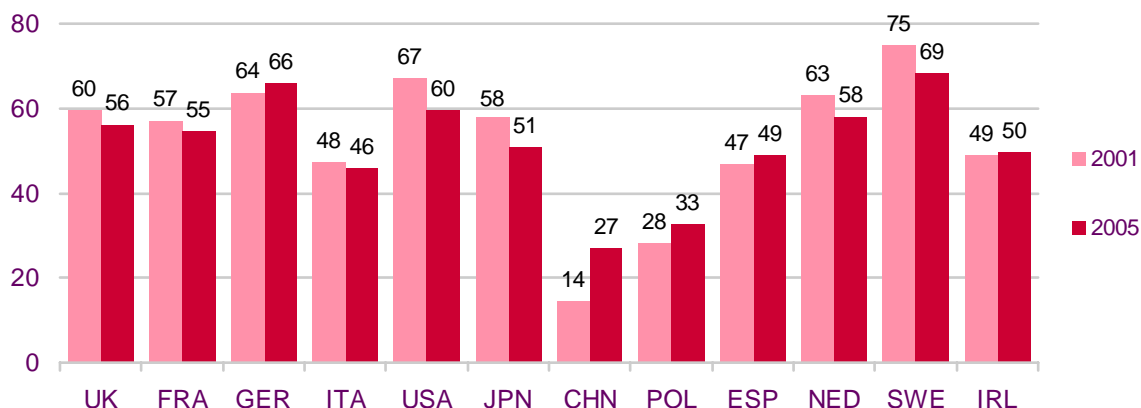
Source: IDATE / National regulators/OECD/Ofcom research

Note: PSTN lines include ISDN connections at PSTN line equivalent (e.g. one ISDN30 line = 30 PSTN lines)

Despite fast growth in the number of lines over the past four years, China had the lowest proportion of lines per 100 population at the end of 2005 within the countries surveyed, with 27 (Figure 2.37). Poland had the second-lowest fixed-line penetration, with 33 lines per 100 people in 2005. Of the remaining countries, Sweden had the highest take-up, at 69 lines per 100 people, followed by Germany with 66 lines. Fixed-line penetration in the UK was slightly above the average (56 lines) for the countries in our analysis, at 51 lines per 100 people.

It is worth noting that measuring the number of lines per 100 population is a useful comparative indicator of fixed-line density, but is not a direct measurement of the number of people or households with access to fixed lines. The latter would require a split between residential and business fixed lines, which is difficult to obtain on a comparative basis for different countries.

Figure 2.37: Fixed lines per 100 population



Source: IDATE / National regulators/OECD/Ofcom research

Note: PSTN lines include ISDN connections at PSTN line equivalent (e.g. one ISDN30 line = 30 PSTN lines)

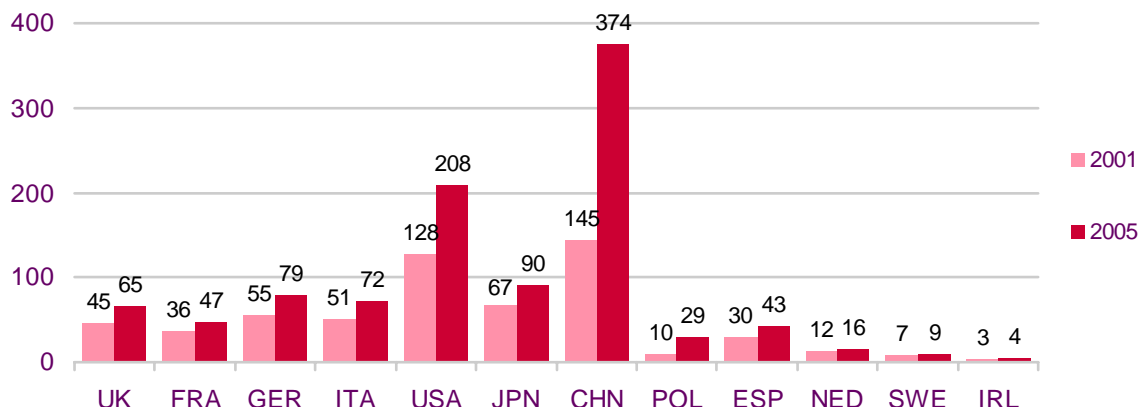
2.3.2 China also pulls away in mobile subscriptions...

An analysis of mobile subscription growth shows that China achieved dramatic increases in subscriptions between 2001 and 2005 – growing by 230 million over this period (Figure 2.38). Poland had the highest growth rate, at 190 %, or 19 million subscriptions. The US also experienced strong growth, particularly in 2005 when there was an increase in subscribers of 32 million (19%) in one year. Growth between 2001 and 2005 was more modest in Sweden (27%), France (29%) and the Netherlands (35%), mainly due to already-high penetration levels in 2001. In the UK, the number of mobile subscriptions increased by 46% (20.1 million) between 2001 and 2005.

By the end of 2005, China was by some margin the world's leading mobile country by number of subscriptions, with nearly 375 million – more than the entire population of the European Union, and almost six times the UK figure of 65.5 million. The US was second with just over 200 million.

Figure 2.38: Mobile subscriptions

Millions



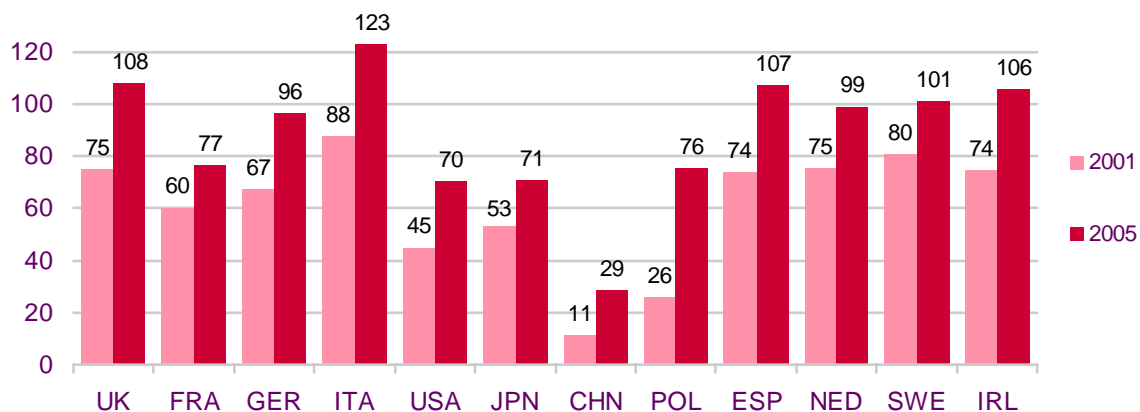
Source: IDATE / National regulators/OECD/Ofcom/operators

2.3.3 ...but remains at the bottom of the pack for mobile penetration

A different picture emerges when mobile subscriptions per 100 population are examined for each country (Figure 2.39). While China had the largest number of subscriptions at the end of 2005, mobile penetration was actually the lowest among the countries surveyed, at around 29%. By 2005, Italy, Spain, Ireland, Sweden and the UK all had more mobile subscriptions than inhabitants, meaning that a proportion of users had more than one mobile subscription each. In Italy, there is anecdotal evidence to suggest that many people have multiple pre-pay mobile subscriptions, which they use at different times of the day or for calls to different networks. Similarly, in the UK there is a high level of multiple SIM card use, and our consumer research in Q4 2005 indicated that 11% of mobile owners used two or more mobile devices with different numbers. This number is likely to increase further due to the recent rise in the take-up of secondary business mobile devices such as Blackberries.

It is also worth noting that mobile penetration in France, the US and Japan was noticeably lower at the end of 2005 than in the other industrialised nations in the list. This may be due to a combination of cultural and demographic factors, in addition to country-specific issues such as the 'receiving party pays' charging system in the US.

Figure 2.39: Mobile subscriptions per 100 population

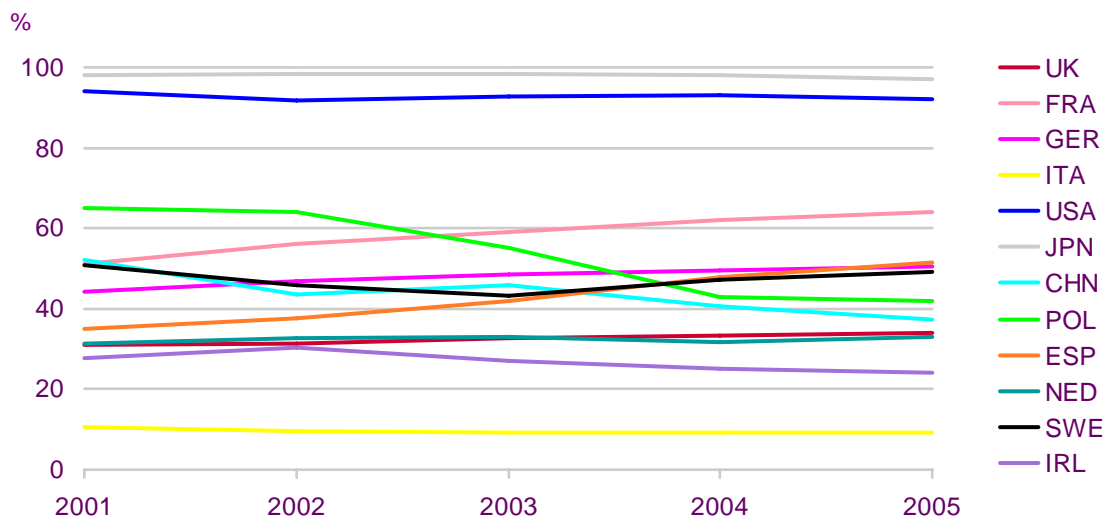


Source: IDATE / National regulators/OECD/Ofcom/operators

2.3.4 Pre-pay/post-pay mix varies significantly between countries

Figure 2.40 below shows the proportion of post-pay (sometimes known as 'contract') subscriptions in each country. It shows that virtually all subscriptions in Japan and the US were contract-based over the entire period of analysis, while in Italy over 90% of subscriptions were pre-pay (or 'pay-as-you-go') with no tied contract. Of the remaining countries, the UK had 66% pre-pay subscriptions in 2005, while by contrast some 64% of French subscriptions were via contracts.

Figure 2.40: Post-pay as proportion of total mobile subscriptions



Source: IDATE / National regulators/OECD/operators/Ofcom/operators

2.3.5 3G penetration is highest in Japan, while Italy tops European 3G league

3G mobile services were first offered in Japan and South Korea in 2002, with many European countries following suit in 2003 and 2004. 3G (using many different standards, explained in more detail below) allows users to access advanced data services, and to download audio and video content at much faster rates than over 2G or 2.5G networks. Most countries are still in the build phase of their 3G networks – substantial incremental infrastructure investment is required, due to the shorter signal propagation characteristics of 3G frequencies compared to 2G (resulting in a higher required density of base stations).

3G mobile technologies

3G technologies provide increased voice capacity and higher-speed mobile data access compared to 2G and support multimedia applications. The distinction between 2G, 2.5G and 3G is primarily based upon data speeds, resulting in some difference of opinion on the categorisation of various technologies. The following technologies are generally considered to be 3G:

W-CDMA (Wideband Code Division Multiple Access) is part of the UMTS family standardised by 3GPP. It is the most popular 3G technology in Europe and Japan (NTT DoCoMo's FOMA) while it is also becoming increasingly popular in the US. The maximum downstream speed is 384 Kbit/s although actual speeds are around 200 Kbit/s. It is a mass-market technology, with 75m subscribers worldwide.

HSPA (High Speed Packet Access), often referred to as 3.5G, is an extension to the original W-CDMA standard providing significantly higher data rates. HSDPA (downlink) can provide theoretical maximum downlink speeds of 14.4 Mbit/s. However, current implementations and devices support maximum speeds of 1.8 Mbit/s and 3.6 Mbit/s while typical speeds range from 0.5 to 1.5 Mbit/s. The first large-scale commercial HSDPA network was launched in the US by Sprint at the end of 2005 while more than 70 networks support HSDPA today.

HSUPA (uplink) will support maximum uplink speeds of 5.76 Mbit/s (increased from 384 Kbit/s available with HSDPA) and is expected to be commercially available in 2007. Initial deployments will support up to 1.5 Mbit/s. The investment required to develop HSPA networks consists mainly of relatively cheap software upgrades which will probably lead to a decrease in average cost per bit carried over mobile networks.

TD-CDMA (Time Division – CDMA) is also part of the 3GPP UMTS family with limited adoption to date, mostly for fixed/nomadic wireless access. In the UK it is being used by UK Broadband. It is suitable for use in unpaired spectrum bands and offers variable uplink/downlink data rate ratios (a feature particularly useful for asymmetric or broadcast services such as mobile TV). TDtv, the mobile TV standard developed by IPWireless, is based on this technology. Maximum downlink speeds of up to 12 Mbit/s have been reported.

TD-SCDMA (Time Division Synchronised Code Division Multiple Access) is a 3G standard developed in China, expected to be mainly deployed in its home market. The Chinese authorities aim to award at least one TD-SCDMA licence.

CDMA2000 (also known as CDMA 1X, CDMA2000 1X) is a high-speed mobile technology used widely in the US and Japan as well as other parts of Asia Pacific and in Latin America. It offers maximum speeds of 153 Kbit/s in both directions (average 60-100 Kbit/s) and is backward and forward compatible with IS-95 (its 2G predecessor), a fact that has helped its wide adoption. Although considered a 3G technology its data performance is comparable to GPRS (a 2.5G technology in the GSM/UMTS family) in most current deployments.

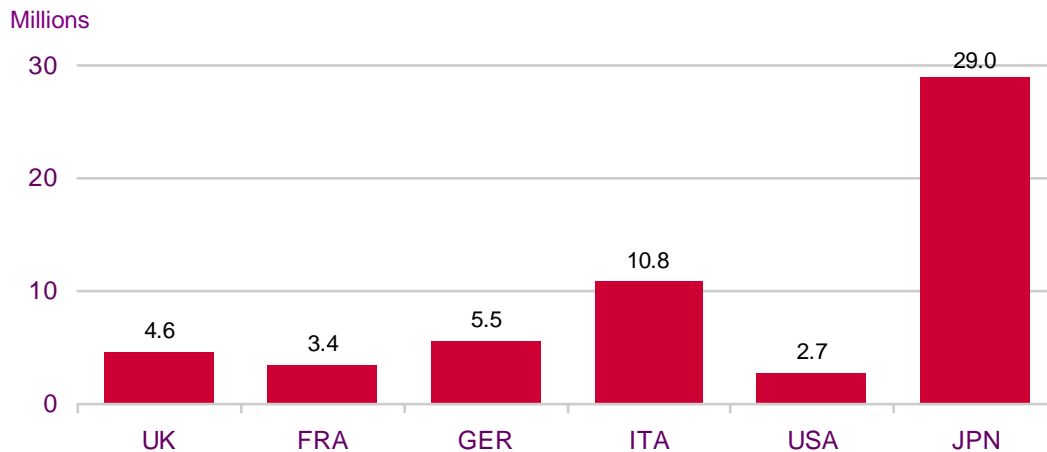
CDMA2000 1xEV-DO (Evolution-Data Optimised) is an extension to CDMA2000 (similar to what HSDPA is for WCDMA) that can provide downlink speeds of up to 2.4 Mbit/s (average 300-600 Kbit/s). EV-DO Revision A will provide maximum downlink at 3.1 Mbit/s and 1.8 Mbit/s uplink (average 300-600 Kbit/s both ways).

As Figure 2.41 below shows, Japan is the clear leader in 3G subscriptions, which is hardly surprising, as Japan was the first country to introduce large-scale commercial 3G services. At the end of 2005, Japan had almost three times as many 3G subscribers (29 million) as the next highest country, Italy, with 10.8m. The UK had just under 5 million 3G connections at the end of 2005, while Germany had over 5.5 million. China was not included, as no 3G

networks had yet been deployed there. At the time of writing, it was not yet certain which technologies would be used, and when the licences would be awarded.

Note that the 3G connection data shown in Figure 2.41 reflect the estimated number of 3G SIM cards connected to a network, and are not equal to the number of individual 3G users or 3G phone owners – it is possible that one person may have more than one active 3G connection, for example those with both a 3G handset and a 3G-enabled data card for their laptop.

Figure 2.41: 3G connections, 2005



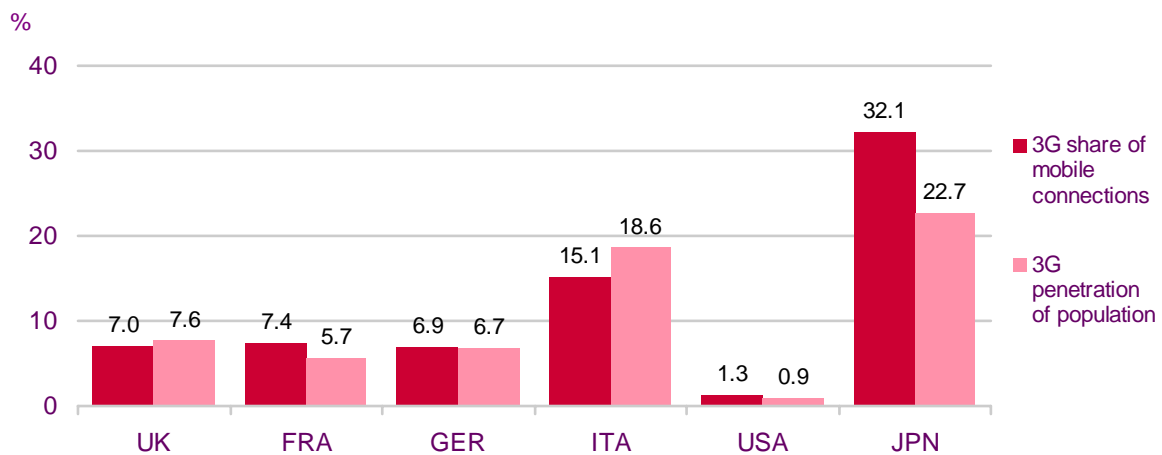
Source: Analysys

Note: Figures do not include CDMA2001x subscriptions

Measured as a proportion of total mobile connections, 3G was again most popular in Japan, where share was twice as great as in Italy; however, when the total population is used as the base, Japan's 3G penetration was only 22% higher than Italy's. (Figure 2.41)

Generally, the countries in our analysis kept the same rank for both penetration indicators, except for France and Germany. While Germany had a higher number of 3G subscribers and a higher penetration of total population than France, the share of 3G connections as a proportion of total mobile connections was greater in France.

Figure 2.42: 3G penetration, 2005



Source: Analysys

Note: Figures do not include CDMA2001x connections

It is important to note, however, that the number of connections cannot be equated to usage levels. For example, it does not necessarily follow that because Italy has twice as many 3G subscriptions as Germany, there is twice as much 3G traffic, only that twice as many subscribers can use 3G services. Moreover, 3G subscriptions or traffic are not directly representative of mobile data use, as earlier technologies, such as GPRS, can be used for data services such as multimedia messaging and mobile internet access.

Figure 2.43 shows the findings of a survey by Ipsos, which looked at the use of mobile phones and other wireless devices to access the internet in different countries. Japan has by far the highest proportion of adults who access news and information online via a wireless device, at 40% of adult population. The UK was second, with 29%, followed by the US, with 26%.

The high level of internet use via wireless devices in the US, compared to the relatively low 3G subscriber base, is explained by widespread adoption of the CDMA2001x standard, which allows high data speeds but is often classified as a 2.75G technology. The relatively high use in China, at 10%, is explained by the fact that the survey looked at an urban-only sample in this country.

Figure 2.43: Use of wireless devices to access news and information online

% adults



Source: IPSOS

Note: Urban sample only in China, no data available for Italy

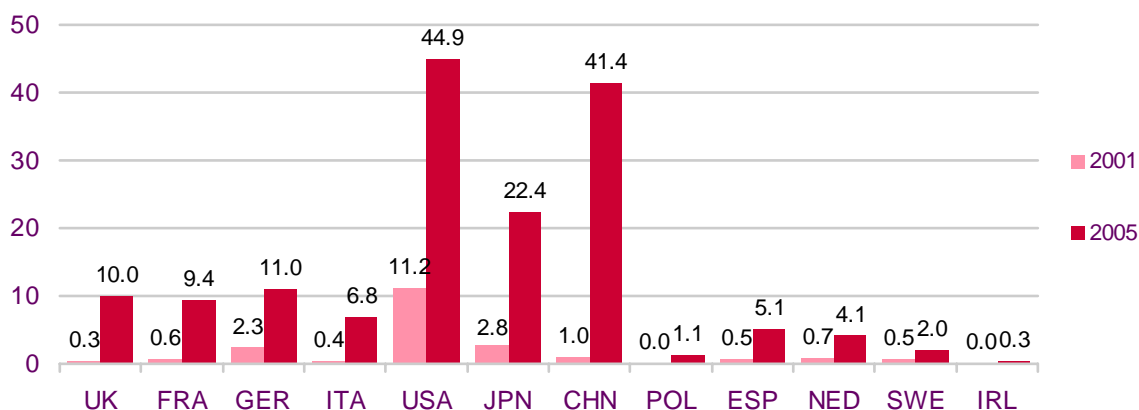
2.3.6 US leads in broadband connections, but China is catching up fast

In broadband, the number of connections in each country rose steeply between 2001 and 2005 (Figure 2.44). The highest growth rate was in China, where connections grew from around 1 million in 2001 to over 40 million by the end of 2005. The number of UK connections grew by 27% (9.5m), while France and Italy both increased by over 14%.

At the end of 2005, while the US was still the largest broadband market, China was close behind – and an extrapolation of the growth curves shown in Figure 2.44 suggests that the number of broadband connections in China might have overtaken those in the US by mid-2006.

Figure 2.44: Broadband connections

Millions



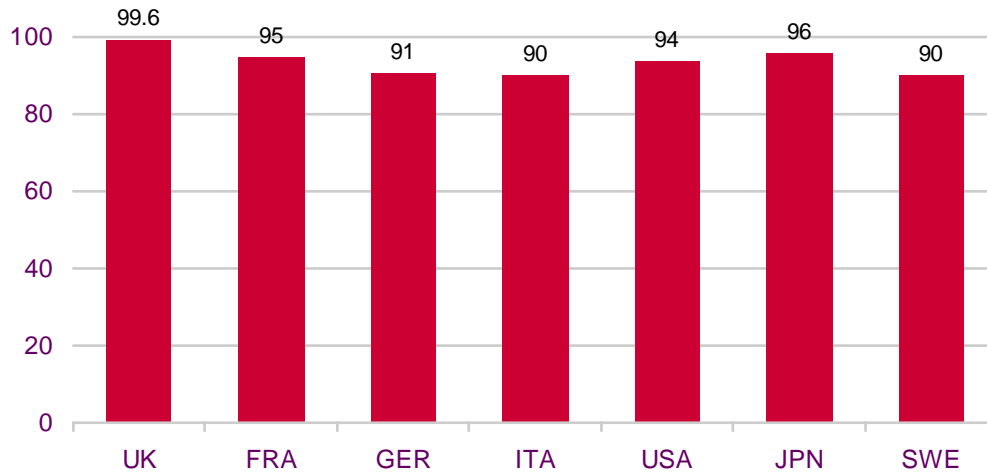
Source: IDATE / National regulators/OECD/Ofcom/operators

Broadband availability was high among all of the territories for which figures were available (Figure 2.45). Sweden and Germany had the lowest estimated availability amongst this sample; however, 90% of their citizens were still able to subscribe to broadband services. A 2006 report prepared by Ovum and the DTI indicated that the UK had the highest broadband availability of the countries in our analysis, at just under 100%; according to BT, 99.6% of UK

premises are now connected to a DSL-enabled telephone exchange at 512 kbit/s speeds or higher.

Figure 2.45: Broadband availability, 2005

% population with access to a terrestrial broadband solution



Source: Ovum/DTI/BT

Note: UK figure is for percentage of premises which can receive broadband at 512 kbit/s

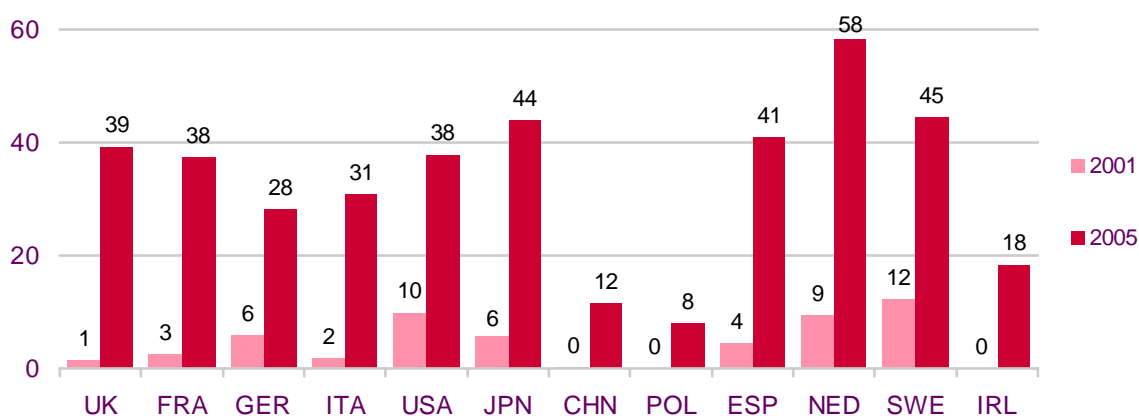
2.3.7 The UK climbs the broadband penetration league

In a similar pattern to our mobile penetration analysis, China's large number of broadband connections actually represents a low penetration of households. By the end of 2005, Chinese broadband penetration represented around 12% of households, compared with almost 40% in the UK, and 44% in Japan (Figure 2.46).

Penetration growth between 2001 and 2005 was highest in the Netherlands where 49% of households connected to broadband, followed by Japan and the UK, which both had 38% penetration growth over the period. Broadband penetration in the UK overtook that of the US and France for the first time in 2005.

These figures are not accurately indicative of the proportion of homes with broadband connections. This is because a certain unquantifiable proportion of reported broadband connections in each country are to home businesses or small businesses, meaning that actual household penetration in each country will be slightly lower than the figures shown in the chart.

Figure 2.46: Broadband connections per 100 households



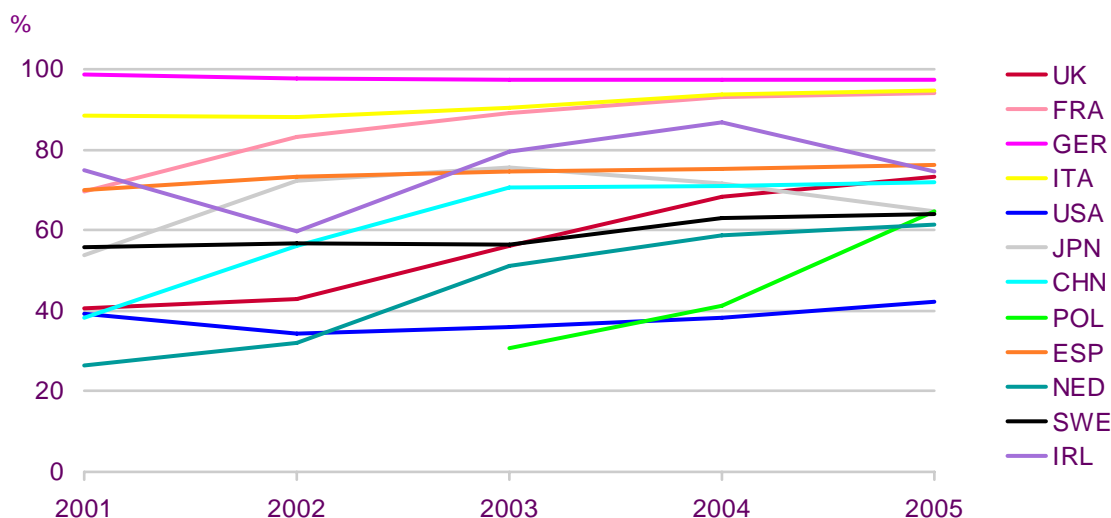
Source: IDATE / National regulators/OECD/Ofcom/operators

2.3.8 Broadband delivery platforms vary widely, but tend towards DSL

For each country in our analysis, the mix of platforms over which consumers receive broadband internet varies markedly. Figure 2.47 below shows the proportion of broadband connections in each country that are provided over DSL via the copper local loop telephone network. It shows that by 2005 virtually all German connections were via DSL, as were 94% of connections in France and Italy. The UK, Spain, Republic of Ireland and China all had between 65% and 75% connections via DSL by the end of 2005, while the US stood out as the country with the lowest DSL mix – at around 40% by 2005.

The situation in Germany is particularly interesting, as the country has an extensive cable network which appears little-utilised for cable broadband. This is probably because the cable network was previously owned by the incumbent fixed-line operator Deutsche Telekom, which was forced to sell it in the late 1990s. Deutsche Telekom therefore chose not to invest in cable broadband activities pending the sale, which took many years to complete. This may possibly explain why cable broadband was not successful in Germany, especially during the high broadband growth years of 2002-2005.

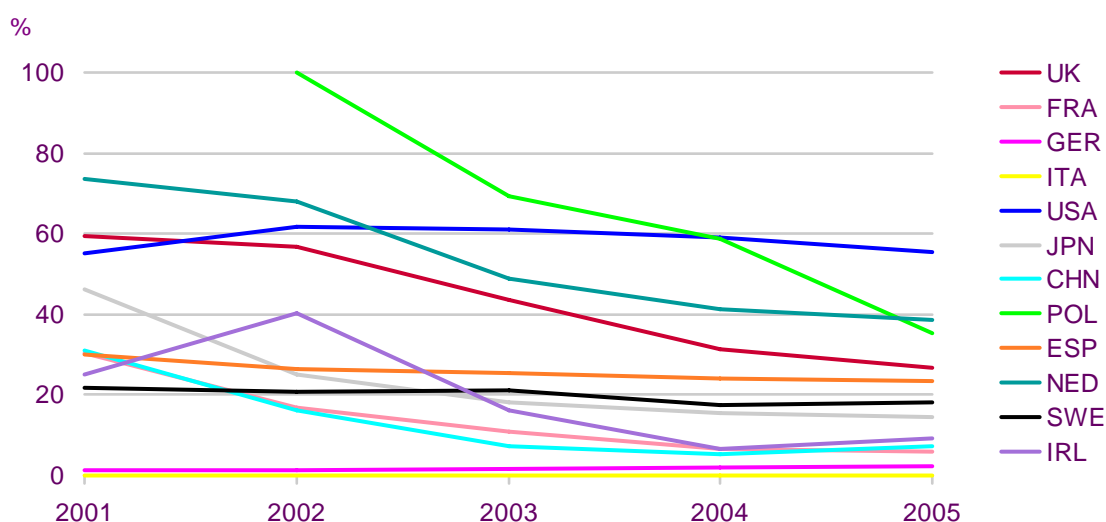
Figure 2.47: DSL as proportion of total broadband connections



Source: IDATE / National regulators/OECD/Ofcom/operators
 Note: Data for Poland not available prior to 2003

The corollary to this is Figure 2.48 below, which shows the proportion of broadband connections supplied via cable modems. Italy had no connections via cable modem by 2005, and Germany had less than 3%. This reflects the nature of the cable industries in both of these countries, as previously discussed. By contrast, the US used cable modems for over 55% of its broadband connections by 2005, again reflecting the more integrated position of the US cable industry, owing to cable's strong position in TV delivery since the 1980s. The Netherlands (39%) and Poland (35%) also had relatively high shares of cable broadband connections in 2005, followed by the UK (27%).

Figure 2.48: Cable modem as proportion of total broadband connections



Source: IDATE / National regulators/OECD/Ofcom/operators
 Note: Data for Poland not available prior to 2003

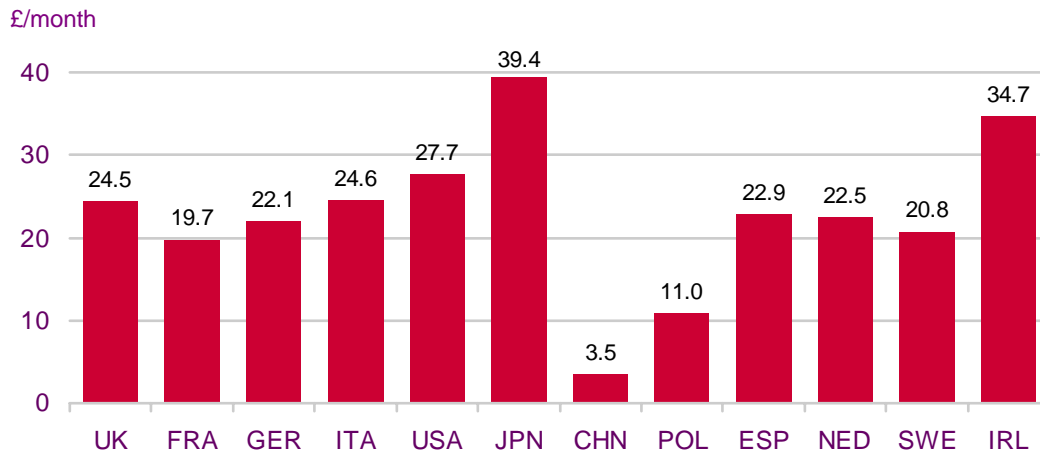
2.3.9 Fixed-line average revenue per user is in decline almost everywhere

Figure 2.49 below shows the variation in estimated fixed-line average revenue per user (ARPU) across countries. It shows that Japan had the highest ARPU levels, at around

£39/month equivalent by 2005, and that China had the lowest levels (around £4 equivalent). However, these figures should be viewed in the context of significantly different costs of living and purchasing power parities (PPPs) in these countries.

Of perhaps more interest is the trend in ARPU from 2001 to 2005. Most countries in our analysis have experienced gradual ARPU reduction over this period, reflecting falling prices, except for China where the decline was possibly caused by the lower spend by new fixed-line subscribers. Germany and Japan were the only countries where fixed voice ARPU has increased very slightly over the five years.

Figure 2.49: 2005 fixed-line voice ARPU

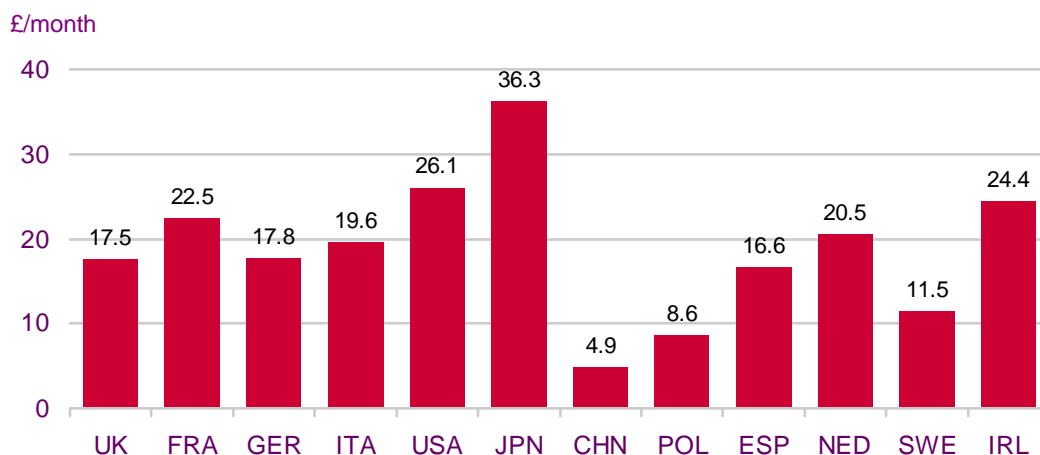


Source: IDATE / operators/national regulators/OECD/Ofcom/operators

2.3.10 Mobile ARPU stabilises as increased usage counters falling prices

In mobile, 2005 ARPU levels varied, with Japan showing the highest levels and China the lowest (Figure 2.50). However, time-series analysis again throws up some interesting differences. Mobile ARPU declined by over 30% in Poland and by over 15% in Japan and Sweden, with Germany and China also experiencing declines between 2002 and 2005. ARPUs remained relatively flat for most other countries in the analysis, while the UK and France saw increases of around 10% and 14% respectively. This reflects the offsetting effect of increased usage and falling prices.

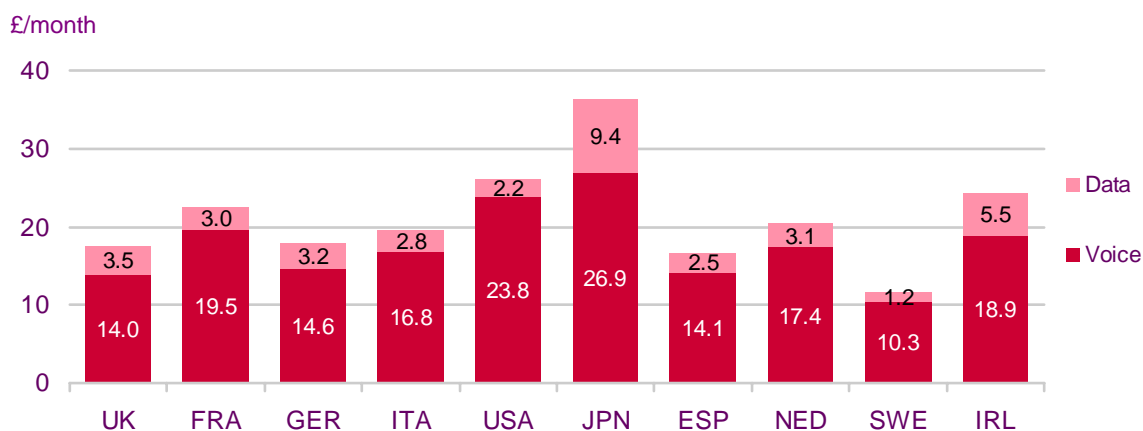
Figure 2.50: Mobile service ARPU, 2005



Source: IDATE / operators/national regulators/OECD/Ofcom/operators

Figure 2.51 below shows the estimated 2005 mobile ARPU split into its voice and data components. It shows that Japan had a significantly higher level of data ARPU than all other countries in the list, and that, at 26%, data also comprised a higher proportion of total ARPU than for most other countries. This reflects the higher integration of data services into the Japanese mobile market – the bulk of other countries’ data ARPU still came from simple SMS services by 2005. Ireland and UK also had a relatively high share of data in total mobile ARPU, at 23% and 20% respectively.

Figure 2.51: Mobile voice and data ARPU, 2005



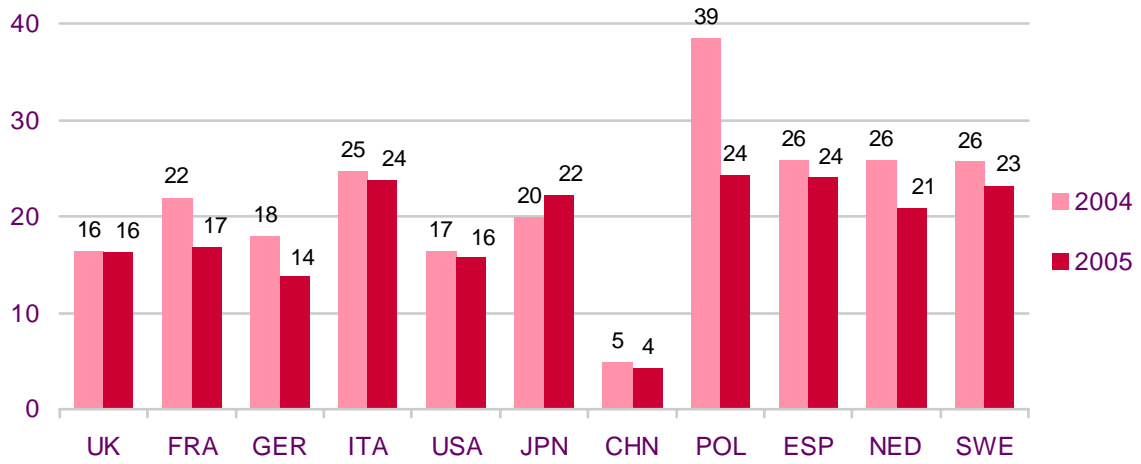
Source: IDATE / National regulators/OECD/Ofcom/operators

2.3.11 Broadband ARPU falls as operators cut prices

Analysis of broadband ARPU shows that it fell across most constituent countries between 2004 and 2005 – largely as a result of ongoing price cuts. This was despite the fact that most operators increased the connection speeds of their broadband offerings during the year. The UK had one of the lower broadband ARPUs, at just over £16 per month, with only China, Germany and Italy having lower ARPU in 2005. Interestingly, broadband ARPU in Japan bucked the trend, increasing by 12% between 2004 and 2005.

Figure 2.52: Broadband ARPU

£/month



Source: IDATE / Operators/national regulators/OECD/Ofcom/operators