PUBLIC CONSULTATION

July 2007

Public consultation on the challenges tied to new frequency bands for electronic communication services access networks

July 2007 - 26 September 2007

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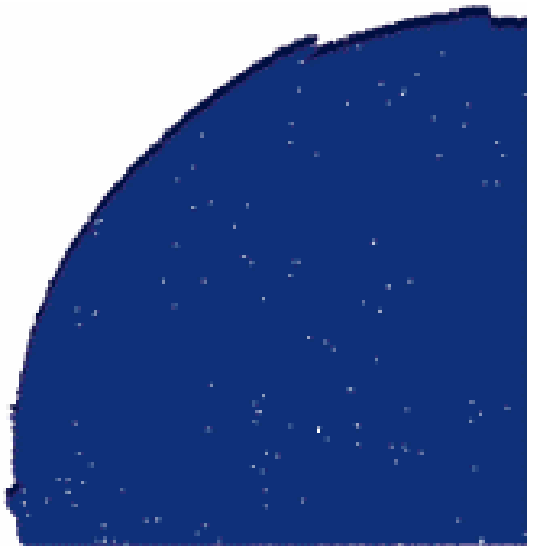

Introduction

The radio spectrum in an intangible asset belonging to the State, whose efficient use is of major societal and economic importance for France. The report[1] of the Commission on the immaterial assets indicates that the revenue generated by use of the radio spectrum is estimated at over 200 billion euros a year in Europe, or close to 2% of European GDP. The intensive use of the radio resource has led to a situation of scarcity, and the development of innovative wireless technological solutions is being hampered nationwide by this limited ability to access the radio spectrum.

Mobile electronic communication services will undoubtedly follow the same evolutionary path as fixed services have done, in other words an increasingly swift transition to broadband. Mobile broadband access is indeed expected to become a natural extension of fixed Internet offers, in a bid to provide consumers with continuity in their personal access to online services, whether at home, on the move or in the workplace, and this across the country. Should virtually unlimited mobile offers be developed, comparable to those that are being marketed successfully by fixed operators, a market explosion similar to the one that has taken place in the fixed broadband market could well occur.

It thus becomes necessary to provide the market with the means to enable this evolution. We need to identify additional spectrum resources, particularly in the low frequency bands, so that these services can be offered nationwide. Low frequency bands have much better physical radio propagation characteristics (range and indoor penetration) than high frequency bands which are ill-suited to achieving large-scale coverage for mobile broadband services.

The switchover of the terrestrial TV service from analogue to digital thus provides an historic opportunity. Broadcasting a channel in digital requires roughly six times fewer resources than broadcasting an analogue channel. Digitising analogue terrestrial broadcasting thus makes it possible to free up a sizeable quantity of spectrum for new services that employ the low frequency bands: an increase in available resources referred to as the digital dividend.

The present public consultation therefore concerns strategies for accessing the spectrum employed by electronic communication services access networks and, more specifically, the low frequency bands made available by the digital dividend.

This public consultation is part of a global strategy being conducted by ARCEP for managing and identifying frequency resources for innovative services, and for which public consultations have already been held to gather input from market players and to achieve transparency.

The goal of the first section is to help in determining spectrum access strategies for mobile communication services, at a time of increasingly ubiquitous mobile broadband Internet access, and in view of the specific need for low frequency bands. The ability to develop and increase the coverage of mobile broadband Internet access services is expected to constitute

[1] "*L'économie de l'immatériel : la croissance de demain"* – report of the Commission on the immaterial assets, chaired by Maurice Lévy and Jean-Pierre Jouyet.

the electronic communication sector's primary source of need for accessing low frequency bands.

Alongside this need, wireless access technologies are also contributing to the development of fixed Internet access services across the country. The second part of this consultation thus seeks to quantify the contribution that wireless technologies are making to the development of these services.

The third part presents an inventory of the work being performed to identify additional frequency resources, concentrating on those below 1 GHz, as part of the efforts being devoted to the digital dividend in France and in Europe.

And, finally, the fourth part endeavours to examine industry developments and service rollout projects that employ digital dividend frequencies. It also seeks to measure the impact of these harmonisation efforts on French and European industrial policies in the area electronic communications.

Practical information

Input from persons wishing to contribute must be received by ARCEP by 5 p.m. on 26 September 2007.

These contributions can be transmitted:

- preferably by e-mail to: acces-spectre@arcep.fr;
- or by post to the following address:

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This document is available for download from the ARCEP website.

Players are invited to submit their remarks on all of the points listed hereafter. ARCEP reserves the right to make public all or a portion of the responses received, unless requested explicitly by the author not to do so.

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Glossary

2G	Second generation mobile telephony (generally GSM standard)
3G	Third generation mobile telephony (IMT-2000 family of standards)
ADSL	*Asymmetric Digital Subscriber Line*, widely used DSL technology
DSL	*Digital Subscriber Line*, technologies that enable broadband transmissions over a telephone line
EDGE	*Enhanced Data rates for GSM Evolution,* evolution of the GSM standard, enabling high-speed data transfers
FDD	*Frequency Division Duplex* (see also TDD)
GSM	*Global System for Mobile*, the leading 2G mobile telephony standard
HSDPA	*High Speed Downlink Packet Access*, evolution of the UMTS standard for downstream data transfers, referred to as 3G+ (see also HSUPA)
HSUPA	*High Speed Uplink Packet Access*, evolution of the UMTS standard for upstream data transfers, referred to as 3G + (see also HSDPA)
IMT-2000	*International Mobile Telecommunications 2000*, 3G family of standards comprising 5 FDD standards, chiefly UMTS and CDMA 2000, and several TDD standards
ITU	*International Telecommunication Union*
MMS	*Multimedia Messaging Service*, used on mobile networks
TDD	*Time Division Duplex* (see also FDD)
UMTS	*Universal Mobile Telecommunications System*, 3G mobile telephony standard belonging to the IMT-2000 family
WiMAX	*Worldwide Interoperability for Microwave Access*, family of technological standards for wireless broadband access
WRC	*World Radiocommunication Conference*

1. The challenge of ubiquitous mobile broadband

Mobile electronic communication services will undoubtedly follow the same evolutionary path as fixed services have done, in other words an increasingly swift transition to broadband. Mobile broadband access is expected to become a natural extension of fixed Internet offers, in a bid to provide consumers with continuity in their personal access to online services, whether at home, on the move or in the workplace, and this across the country. Should virtually unlimited mobile offers be developed, comparable to those that are being marketed successfully by fixed operators, a market explosion similar to the one that has taken place in the fixed broadband market could well occur.

It is to this challenge created by the prospect of ubiquitous mobile broadband that this first part is devoted. ARCEP is particularly interested in receiving input from players concerning their views on the upcoming evolution of mobile consumption, and on spectrum access strategies being put into place for mobile communication services. In particular, ARCEP is endeavouring to gain a better understanding of players' frequency requirements as a correlation of their objectives in terms of service offering and national coverage.

1.1 Evolution of mobile services

1.1.1 Shift to mobile broadband

This market evolution was initiated by the introduction of mobile Internet on second generation (2G) networks. In the early 2000s, GPRS enabled speeds of up to several dozen kbps, thus paving the way for services such as digital photography. The advent of EDGE standard networks increased bitrates to over 100 kbps.

A major step forward occurred with the commercial launch of third generation (3G) UMTS mobile communication services. This new standard extended and enhanced the existing offer on second generation networks, delivering bitrates of up to 384 kbps when introduced in late 2004. Operators were thus able to design appealing offers around audio and video content in particular, whose increasing availability since late 2005 has translated gradually into growing demand amongst consumers.

Paradoxically, although the UMTS rollouts, which are now well underway in Europe, are considerably behind initial timetables, the bitrates being delivered for mobile Internet appear to be increasing at an ever faster pace.

While the pioneer UMTS 3G mobile services offered maximum downlinks speeds of 384 kbps, the recent introduction of the UMTS/HSDPA standard now enables downlink speeds of between 1.8 and 3.6 Mbps, in other words comparable to those available on ADSL, while the upcoming deployment of the HSUPA standard is expected to considerably increase uplink speeds as well.

Furthermore, current technological developments do seem to point to the likelihood of even faster mobile access in the coming years, completed by mobile broadcasting infrastructure such as the one provided for by the Law of 5 March 2007 concerning the modernisation of audiovisual broadcasting and the television of the future. Third and subsequent generation

mobile systems are likely to deliver bitrates of one and even as much as several dozen Mbps in a matter of years and, eventually, fourth generation systems may supply speeds of some 100 Mbps.

1.1.2 Traffic growth

On the whole, the development of mobile communication services has been marked by an exceptional rise in traffic, which was initially the result of the swift increase in consumers' adoption of these new services: the number of GSM customers, for which the market was created in the early 1990s, totalled 10 million at the end of 1998 and 52 million by the end of 2006.

Nevertheless, although mobile service penetration in France is now very high – reaching 82% of the population on 31 March 2007 – traffic still continues to rise sharply: the volume of mobile traffic doubled over the course of five years, i.e. between 2001 and 2006, with a 15% increase in traffic between 2005 and 2006 alone. This rise in traffic can be explained in large part by the increase in mobile services consumption, which was stepped up by the introduction of very high volume voice offers, and by the development of multimedia mobile services.

The growth of the multimedia mobile base, which began with 2G evolutions and the rise of 3G since its commercial launch in late 2004, has been remarkable. Multimedia mobile services (i.e. access to mobile Internet services, MMS, etc.) was being used by more than 15 million customers in France in Q4 2006[2].

3G is thus becoming increasingly ubiquitous in both France and across Europe and, according to UMTS Forum figures, now accounts for some 50 million users in Europe.

As the bitrates on offer continue to rise, the development of mobile broadband Internet will undoubtedly mean continued high increases in traffic.

As a result, ARCEP is seeking to gather the players' analyses and forecasts concerning the outlook for traffic growth for mobile communication services. Contributors are thus invited to submit their forecasts on mobile consumption for the coming years. Here, the years 2010 and 2015 can be used as milestones.

Question no. 1: What is your general view of the way in which the mobile communication services market will develop in the coming years? To what extent do you feel that the way mobile Internet access is currently evolving is comparable to the migration to broadband in the fixed access market over the past several years?

Question no. 2: What types of service and bitrates are currently on offer? Using which technologies? To what extent can offers comparable to unlimited broadband Internet access be carried over to mobile?

[2] The multimedia base was only 10.3 millions in Q4 2004 and 14.2 millions in Q4 2005.

Question no. 3: What are your forecasts for mobile broadband access consumption? What rate of adoption amongst the population and what level of mobile traffic growth can we expect?

1.1.3 Economic, cultural and societal challenges

Mobile telephony appeared in the early 1990s and is now a veritable social phenomenon, much in the same way as fixed broadband Internet access which was introduced in the year 2000.

With this in mind, ARCEP wishes to obtain the players' views on the challenges created by the growing ubiquity of mobile broadband Internet access with respect to the development of the digital economy and of the information society. Players are also invited to address the cultural and societal aspects of personal mobile Internet access, the regional development issues involved, and the issues concerning the electronic communication sector's development in both France and in Europe.

Question no. 4: What, in your opinion, are the economic, societal and cultural issues tied to the growing ubiquity of mobile broadband Internet access nationwide? How would you characterise these issues?

1.1.4 Deployment scenarios

Achieving nationwide availability for mobile Internet is a major challenge, while the growing migration to mobile broadband requires that scenarios be identified to be able to ensure that the offers satisfy the social and political need for nationwide coverage.

Increased coverage is primarily the result of the sizeable investments made by mobile operators to maintain or increase their competitive position. To allow operators to make these investments, ARCEP was careful to make additional frequency resources progressively available to operators, as the need arose when deploying their GSM networks: as a result, operators were able to undertake large-scale rollouts that allowed them to achieve expanded coverage, now totalling roughly 97% of the population, over the course of some 15 years – while maintaining quality of service, as much in urban as in rural zones, and despite the sharp rise in traffic.

In addition, the bid to achieve nationwide coverage for mobile telephony recently gave rise to a programme for covering "dead zones", instigated by the national government working in tandem with local authorities. Each second generation mobile operator will thus cover roughly 99% of the population thanks to the "dead zone" programme, by the end of 2007. More recently, an agreement was signed in February 2007 for covering major transport axes[3].

As concerns mobile access to the Internet, one point that must not be overlooked is the vast difference in constraints when deploying networks that deliver different bitrates. As we saw with ADSL, where the broadband service offer depended on the subscriber's distance from the MDF, for mobility, when looking at a given antenna, increasing bitrates means decreasing coverage. This is why offering higher speed access presents a challenge both on the technological front and with respect to coverage.

[3] http://www.interieur.gouv.fr/sections/a_la_une/toute_l_actualite/amenagement-du-territoire/telephonie-mobile-27-02-07

If we consider the bitrates offered by second generation GSM networks, in other words speeds ranging from several dozen kbps with GPRS up to some 100 kbps with EDGE, mobile data services are available over a large percentage of the national territory, at a level comparable to GSM mobile telephony coverage.

Furthermore, achieving nationwide mobile coverage for services running at 384 kbps was one of the central deployment commitments made by Orange France, SFR and Bouygues Telecom, and reiterated as obligations in the frequency licences they were awarded for third generation UMTS mobile network deployments.

Having become aware back in 2000 of the need to encourage large-scale coverage thanks to mobile network sharing, among other things ARCEP rendered public the possibilities for sharing 3G infrastructure that were available to operators[4]. Since then, operators' corresponding rollouts have made considerable strides[5] in their use of frequencies allocated to them: currently the implementation of 3G in the 2.1 GHz band; in future the upgrade to 3G of the 900 and 1800 MHz frequency bands currently employed for 2G.[6]

It is therefore in light of the evolution that is currently underway towards higher bitrates (several Mbps and beyond) that it becomes a worthy exercise to project into the future, given the swift development of UMTS technologies and the emergence of complementary technologies. Here, ARCEP wants to obtain the players' updated predictions on the likely and the best case future national coverage scenarios for mobile broadband access services, and on the factors affecting their feasibility.

Question no. 5: What can we expect in terms of the level of national coverage for mobile broadband access in the coming years? Please characterise these scenarios in terms of bitrate, coverage rate and indoor penetration. What conditions affect the feasibility of these different scenarios?

Question no. 6: To what extent is it feasible to plan on delivering speeds of several Mbps, or higher, nationwide?

Contributors are invited to use the years 2010 and 2015 as milestones.

1.2 Current mobile broadband frequencies

Mobile broadband access services cannot be made widely available unless the networks can absorb the increase in bitrates and traffic. To achieve this, new frequencies are required.

Existing mobile communication services are delivered through the use of allocated frequencies in the 900, 1800 and 2100 MHz bands. These spectrum resources have been allocated to operators progressively to allow them to respond to market development needs.

[4] ARCEP communiqué of 10 December 2001 concerning infrastructure sharing for 3G mobile networks.

[5] These points will not be detailed here. For more information on coverage rates, readers are invited to refer to the licences awarded to operators, and to the ARCEP communiqués concerning operators' rollout deadlines, particularly the communiqués of 20 May 2005 and 29 June 2006.

[6] Frequency issues are the subject of specific sections, detailed below.

As a result, additional frequencies were allocated to mobile operators in several stages over the course of the 1990s and 2000s for the deployment of second generation GSM networks in the 900 and 1800 MHz bands. This allocation of additional frequency enabled the nationwide extension of coverage and the ability to maintain the quality of the services on offer, despite a sharp increase in traffic.

The implementation of third generation UMTS mobile networks led to the award of frequency licences in the 2100 MHz band to mobile operators[7]. In addition, the reuse for 3G of the 900 and 1800 MHz frequency bands currently employed for 2G has already been officially endorsed.

Mobile telecommunications operators now have a 35 MHz duplex in the 900 MHz frequency band at their disposal, along with a 75 MHz duplex in the 1800 MHz band, a 60 MHz duplex for FDD systems and 35 MHz for TDD systems in the 2100 MHz frequency band.

1.3 The need for additional frequencies

The growing ubiquity of mobile broadband Internet, the migration to ever-higher bitrates and the expected increase in traffic demands a re-examination of the correlation between the spectrum resources made available to operators and the needs created by the continued development of mobile communication services. A great many studies tend to point to saturation of the frequency bands currently employed by mobile services by the start of the next decade, particularly in densely populated urban areas. Increased bitrates and traffic do indeed lead inexorably to the need for additional radio resources, and this despite the increased spectral efficiency of future mobile systems.

A number of estimates have been published in a bid to assess the electronic communication sector's medium and long-term spectrum resource needs. In a report[8] published in 2006, the International Telecommunication Union (ITU), for instance, estimates that spectrum bandwidth requirements up to 2020 – including the frequency bands already identified – will be between 1280 and 1720 MHz, compared to close to the 600 MHz used or already identified in France.

Question no. 7: Do your share this view, notably on the upcoming saturation of currently available frequency bands? What are your estimates for spectrum bandwidth requirements in the medium and long term?

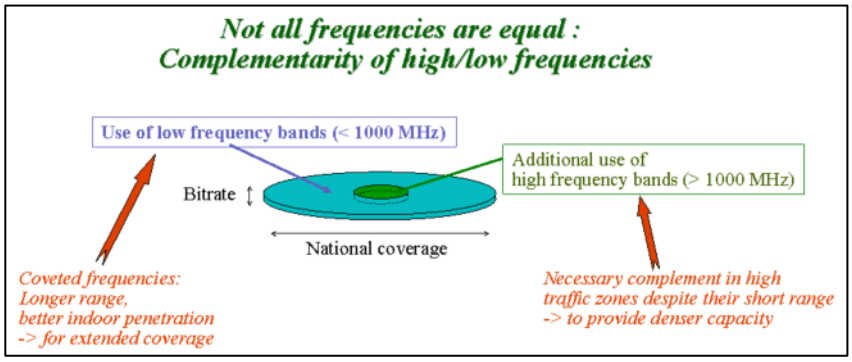
To continue to growth, the mobile market must now rely on a sufficient quantity of suitable frequency bands being made available.

[7] A new call for candidates for the award of the fourth licence in the 2.1 GHz band was launched on 8 March 2007. Orange France and SFR were awarded licences following a call for candidates launched on 18 August 2000, and Bouygues Telecom obtained its licence following an identical procedure that was launched on 29 December 2001.

[8] ITU-R M.2078 report – "*Estimated spectrum bandwidth requirements for the future development of IMT-2000 and IMT-Advanced*".

1.4 Complementarity between types of frequencies

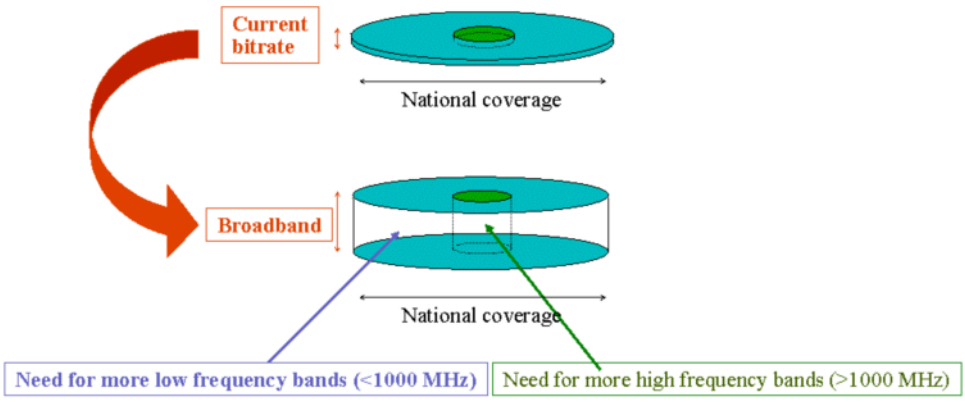
Not all frequencies are equal: a distinction needs to be made between low frequency bands, situated below 1 GHz (1000 MHz), and high frequency bands, situated above 1 GHz, whose physical radio propagation properties are highly disparate.



If the frequency bands situated below 1 GHz make it possible to handle the increase in bitrates and traffic, achieving efficient coverage, particularly in rural zones, and improving the quality of network reception require frequencies below 1 GHz to be made available. These frequencies have better physical radio propagation qualities, enabling a longer range and better indoor penetration. This is why the low frequency bands, i.e. below 1000 MHz, are so highly coveted. They are well suited to achieving extended nationwide coverage for mobile services under reasonable economic conditions, along with indoor penetration equivalent to that of existing networks.

It goes without saying that if these highly coveted frequencies were available in sufficient quantity, mobile networks would all be deployed in these low frequency bands. But, because these bands are occupied for historical reasons by other applications, it is impossible to satisfy mobile networks' needs with only the low frequency bands. These restrictions have thus led mobile networks to use high frequency bands to complement – the low frequency bands being employed to ensure large-scale coverage, with the high frequency bands completing traffic routing capacity where necessary.

The quantity of spectrum that could be made available to mobile services was in fact limited to a frequency band in the 900 MHz range, whose quantity was insufficient to ensure GSM traffic routing and quality of service maintenance. As a result, additional frequency bands had to be found, and availability was identified only in bands increasingly higher up the spectrum (1800 MHz then 2100 MHz). Mobile operators thus invested in these bands to deploy additional capacities in zones where 900 MHz frequency bandwidth was lacking. In a great many less densely populated zones, however, use of only the 900 MHz frequency band has proven sufficient up to now, given the bitrates and traffic consumed.



In light of the elements discussed earlier, additional high and low frequency bands are naturally required to be able to satisfy the greater needs created nationwide as mobile broadband evolves to higher bitrates.

1.5 Outlook for high frequency bands already well established

Making suitable and more numerous frequencies available is an issue of focus in both Europe and internationally, in a bid to spur the development of mobile communication services.

The future prospects for high frequency bands have already been relatively well established. The 2.5-2.7 GHz band, already identified as an extension band for mobile networks, is the subject of work being performed at the European and national levels. In France, these frequencies are occupied by the Ministry of Defence, with which ARCEP is engaged in preliminary efforts to establish a timetable for their liberation. It now seems possible that the first frequencies can be made available sometime around 2010. Moreover, the possible identification of the 3.4-4.2 GHz band for 4G is currently the subject of preparatory works, notably in view of the upcoming World Radiocommunication Conference.

Question no. 8: Do you have any remarks on the availability prospects for high frequency bands (>1000 MHz)?

Question no. 9: What timetable do you think constitutes the best case scenario for making frequencies in the 2.5-2.7 GHz band available? In your view, what zones should be priorities when freeing up this spectrum?

1.6 Challenge of identifying low frequency bands

As it stands, however, no additional spectrum resources have been identified in the low frequency bands (<1000 MHz). Without a sufficient quantity of low frequency bands there is a risk that it will be impossible to offer mobile broadband access services nationwide at the speeds expected by consumers, at an economically reasonable cost. This is a risk that needs to be avoided.

Economic characterisation

ARCEP wants to obtain the players' economic assessment of the situation, through a comparative characterisation of the economic likelihood of offering very high speed mobile broadband services nationwide, according to whether or not additional low frequency bands are made available.

Question no. 10: What are the economically likely national coverage scenarios for mobile broadband access services under the two following hypotheses:

a) without additional low frequency bands (<1000 MHz);

b) with additional low frequency bands (<1000 MHz).

Contributors are requested to base their analyses on cost assessment figures for extended national coverage for mobile broadband services for each of the scenarios, and should specify the planned bitrate.

These scenarios will take account of the spectrum that has already been allocated or identified for mobile services in the 900, 1800, 2100 and 2500 MHz frequency bands.

Characterisation of low frequency band requirements

Contributors are invited to submit a justified assessment of additional low frequency band requirements that they deem necessary to achieving nationwide coverage for mobile broadband access services.

Question no. 11: Is it your view that additional low frequency band (<1000 MHz) resources are required to achieve nationwide coverage for mobile broadband access services with very high data rates? If so, what quantity of spectrum (in MHz) do you think is necessary? By what point in time? For how many operators?

2. Wireless technologies' contribution to fixed broadband

The ability to develop and increase the coverage of mobile broadband Internet access services should constitute the electronic communication sector's primary source of need for low frequency bands. Alongside this need, wireless access technologies are also contributing to the development of fixed Internet access services across the country.

The fixed broadband Internet market is being shaped by a swift evolution to ultra-broadband services, enabled by xDSL and optical fibre technologies in particular.

This section is devoted to quantifying wireless technologies' contribution to the development of these services. In particular, ARCEP wants to gain a better understanding on the quantity of spectrum that players will require to achieve their goals in terms of service offering and national coverage levels.

2.1 Current state of fixed broadband development

On 31 March 2007, there were 13.5 million broadband Internet subscriptions in France, of which 12.8 million were ADSL. The number of subscriptions increased by 800,000 during the Q1 2007 (+6.3%) and by 3 million over the course of one year (+28.9%). Characterised by the growing ubiquity of triple play bundles (Internet, VoIP and TV), the broadband market is currently based chiefly on ADSL technologies.

All of France Telecom's Main Distribution Frames (MDF) have been equipped with DSL since June 2007, and now only 2% to 3% of lines are too long to be eligible for ADSL. The incumbent carrier has also announced a programme for transforming cross-connection points into MDF in sparsely populated areas, the goal being to facilitate fixed broadband coverage nationwide.

Wireless access technologies in the local loop now offer an attractive alternative to wireline systems for connecting customers and providing medium and high-speed electronic communications services. Two outstanding features of these systems are their flexible implementation and the fact of allowing for progressive investment.

In July 2006, ARCEP awarded[9] 49 WLL licences following a selection procedure for the 3.5 GHz band. The advent of WiMAX technology has helped revive interest in this frequency, in view of extending national broadband coverage at speeds comparable to those delivered by DSL. Also being planned is the deployment of nomadic services. Alongside private sector players, local authorities also took part in this procedure: six regional authorities were awarded a licence, and all of their projects target significant rollouts.

Frequencies in the 26 GHz band are also available, with operators' offers concerning chiefly the provision of broadband access to enterprises in business parks.

[9] http://www.arcep.fr/index.php?id=8926

Lastly, providing Internet services also involves the deployment of Wi-Fi services, making very high-speed access available in a localised area: as a result, there are now tens of thousands of wireless hotspots in France.

The complementary nature of wireline and wireless solutions contributes to enabling full broadband coverage nationwide. Both a societal and an economic issue, this topic has already been the focus of government action plans. ARCEP has devoted itself to the issue through the creation of the public-initiative networks committee, CRIP (*Comité des réseaux d'initiative publique*) and by creating a section[10] on its website dedicated to local authorities.

2.2 Transition to ultra-broadband

In the medium and long term, the fixed broadband access market will be shaped by an increase in bitrates spurred by a diversification of increasingly innovative and bandwidth hungry services.

In densely populated zones, the gradual introduction of optical fibre access solutions will make it possible to satisfy this need, delivering symmetrical bitrates of up to 100 Mbps, well above the capacity of the copper pair. Elsewhere, providing very high speed broadband access to the Internet will require other technologies.

Question no. 12: In your opinion, how will the broadband access market evolve? What will be the medium-term trends in this market? What types of service will be offered, and over what speeds?

2.3 The role of wireless technologies in fixed ultra-broadband access

The role that wireless technologies will play in the fixed access market of tomorrow needs to be examined, not only by taking account of the migration of fixed access to ultra-broadband, but also by assessing the specificities of wireless local loop system deployments several years from now, compared to those of (especially 4G) mobile broadband systems.

Particularly when deployed in view of delivering fixed indoor connection via the rooftops, as opposed to continuous coverage, wireless local loop networks have a number of particular, technical-economic features that distinguish them from mobile networks.

On the other hand, these distinctions tend to disappear when deploying a wireless broadband nomadic access services. Through convergence, this evolution could thus help lessen the distinction between fixed wireless high speed broadband access services and mobile high speed broadband access services.

ARCEP is therefore keen to obtain players' forecasts on this issue, along with their analysis of whether or not, in view of gaining access to new frequencies, a distinction should be maintained for wireless technologies between fixed broadband access services and mobile broadband access services.

[10] http://www.arcep.fr/index.php?id=2097

As part of the broadband market's migration to very high speed broadband services, the challenge lies in the capacity to develop wireless access technologies capable of delivering speeds similar to those supplied by fixed broadband access technologies, using reception terminals via outdoor antennae, for instance.

Question no. 13: What is your assessment of the long-term complementarity of wireline and wireless solutions for delivering fixed broadband access services nationwide?

Question no. 14: What are your views on the distinctiveness and convergence of mobile communication networks and fixed wireless broadband access networks? To what extent should a distinction be maintained in future when seeking access to new frequency bands? In particular, what specificities should wireless access technologies maintain to be able to deliver bitrates comparable to wireline technologies in the medium and long term?

If, in the medium and long term, wireless technologies will continue to have a role in the fixed ultra-broadband access services ecosystem, what needs to be examined is the extent to which access to new frequency bands below 1 GHz will be necessary to complement the high frequency bands that have already been identified. Fixed services will create a need over and above the one expressed by mobile broadband services for identification of additional resources in suitable frequency bands.

Question no. 15: In the medium and long term, what are the different economic and technical national coverage scenarios for wireless broadband access networks providing with very high data rates, according to the frequency bands used? What specific role will be played by the 3.5 and 26 GHz frequency bands?

In your response, please provide a distinction between a scenario where new frequency bands will be available, notably under 1 GHz, from one where no new spectrum can be allocated. For the first scenario, please indicate and justify the spectrum resource required.

And, finally, wireless technologies have managed to play a role in the challenge posed by indoor fixed broadband coverage – one example being wireless LAN that help prolong fixed broadband access. The advent of fixed ultra-broadband will be appealing only if indoor coverage technologies are able to keep up with the ongoing increase in the bitrates being offered. Here, then, we need to examine the frequencies and technologies that will be needed to achieve this type of coverage.

Question no. 16: In your opinion, how will wireless technologies evolve with respect to delivering indoor fixed broadband access services with very high data rates? What type of frequencies is likely to be used?

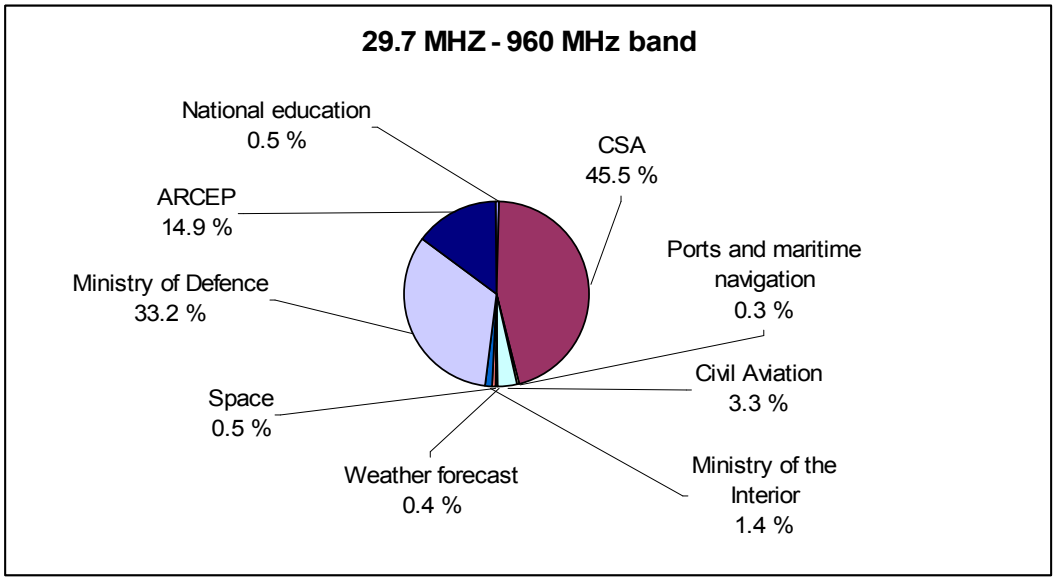
3. Opportunities for accessing low frequency bands

The preceding sections illustrated the reasons for which access to new low frequency bands, i.e. under 1 GHz (1000 MHz), is necessary to allow fixed and mobile broadband access services to be made available nationwide in an economically reasonable fashion.

The question thus arises of possible solutions for identifying these low frequency bands.

3.1 Current situation concerning low frequency bands

The current manner in which the radio spectrum below 1 GHz is allocated derives from the historical use of these frequency bands by military applications and, since the 1950s, by broadcasting services. A quantitative examination of the distribution of frequency bands between 29.7 and 960 MHz (see chart below) reveals that the Ministry of Defence controls close to a third of these resources, and the French broadcasting regulatory body, CSA (*Conseil supérieur de l'audiovisuel*) more than 45%.



The frequencies below 1 GHz allocated to ARCEP are today restricted, and do not reflect the current development of electronic communication services.

3.2 Opportunity created by the digital dividend

The migration of the terrestrial TV service from analogue to digital creates an historic opportunity. Analogue television currently occupies close to 400 MHz of bandwidth (470 to 862 MHz), based on frequency planning methods that were established starting in the 1950s. Broadcasting a channel in digital, however, requires roughly six times fewer resources than broadcasting an analogue channel. Digitising analogue terrestrial broadcasting thus makes it possible to free up a sizeable quantity of spectrum for new services in the low frequency bands: an increase in available resources referred to as the digital dividend, as defined at the

European level[11] and by the law of 5 March 2007 concerning the modernisation of audiovisual broadcasting and the television of the future.

The Law of 5 March 2007 also sets the modalities for the allocation of spectrum that will be freed up by the full migration to digital terrestrial broadcasting. Article 2 specifies that the Prime Minister is responsible for the reallocation of these frequencies, following consultation with the digital dividend Commission, composed of four deputies and four senators. It also indicates that a majority of the liberated spectrum will continue to be allocated to audiovisual services.

3.3 Status of work being performed in France and at the European level

The Digital strategy planning committee, CSN (*Comité stratégique pour le numérique*), which is chaired the Prime Minister of France, is currently devoted to this issue from a national perspective, in accordance with the Presidential Decree[12] of 3 May 2006. CSN is thus in charge of coordinating and steering the actions undertaken in view of the re-use of frequencies freed up by the analogue switch-off.

In addition to work being performed at the national level, efforts are also being made at the global and European levels.

At the global level, the World Radiocommunication Conference (WRC) will be held in Geneva in late 2007. The French position for this Conference is to achieve greater flexibility for the 470-862 MHz frequency band by adding a reference to mobile services at the WRC in 2007, giving them equal status with broadcasting services, without prejudice to the future use of this frequency band. This would allow for a resolution to be adopted at the Conference requesting studies be performed by the ITU in view of identifying a harmonised frequency sub-band for mobile services to be announced at the WRC in 2011. This resolution would give countries the freedom to harmonise these frequency bands themselves.

At the European level, the Radio Spectrum Committee, RSCom, composed of the Commission and EU Member States, has mandated the European Conference of Postal and Telecommunications Administrations (CEPT) to perform technical harmonisation studies in view of identifying the adjacent sub-bands for mobile and multimedia services (mobile TV) in the frequency bands below 900 MHz.

As a result, the CEPT created the TG4 working group to fulfil the Commission's mandate. In mid-June the group submitted the following conclusions:

- the feasibility of the harmonisation of a contiguous frequency sub-band has obtained official endorsement; harmonisation of the band is not mandatory, but rather applied on a voluntary basis by States that so desire;
- the sub-band must be situated in the upper range of the UHF band; it must include at least channels 62 to 69, in other words the 798 to 862 MHz frequency bands (a total 64 MHz), with studies carried out at the national level and multilateral negotiations between neighbouring countries to determine the exact size, per country, of this frequency sub-band.

[11] *RSPG Opinion on EU Spectrum Policy Implications of the Digital Dividend – Document RSPG07-161.*
[12] http://www.admi.net/jo/20060504/MCCX0600360D.html

These conclusions are the result of a compromise that seeks to make a large enough sub-band available to enable the introduction of mobile communication systems, while minimising the impact on the frequency plan negotiated in Geneva in 2006, and which is to be put into place when analogue broadcasting is fully switched off.

This report was approved at the July 2007 meeting of the CEPT's Electronic Communications Committee (ECC), and will be forwarded to the European Commission which hopes to issue a statement on the issue of the digital dividend by the end of 2007.

The French National Frequency Agency, ANFr (*Agence nationale des fréquences*), which CSN mandated to identify such a frequency sub-band for France – without prejudice to its allocation or the type of service likely to use these frequencies – has recently submitted its initial findings.

The Agency also confirmed the feasibility of the implementation of a frequency sub-band in France, compatible with the initial conclusions of work performed at the European level, while maintaining current and future capacity, as required by law, for broadcasting services (seven multiplexes including one for personal mobile TV). It should be pointed out that the progress being made by compression and planning technologies will also open up new possibilities for broadcasting services in future.

The fact of maintaining capacity for broadcasting services, or even increasing it thanks to optimised planning modes for audiovisual services, could require alterations to be made to the plan ratified in Geneva in 2006, which would be carried out concurrent with negotiations for implementing this frequency sub-band. Naturally, these negotiations must be carried out multilaterally with neighbouring countries.

The National Frequency Agency has not yet reached a conclusion on the size of the sub-band, as it has only studied the minimum European scenario of 64 MHz. Further studies devoted to scenarios for larger size sub-bands are currently underway. They could be completed by the work being performed by the UMTS Forum, which is conducting similar studies that are due for completion in September 2007.

In addition to these studies, harmonisation efforts must continue to maintain an open debate on the use of newly liberated frequency bands, and this in a context of European harmonisation. As underscored by Senator Bruno Retailleau in a recent report[13] submitted to the Senate Economic affairs commission, 'the fact of not identifying a frequency sub-band that ensures uniform national coverage within the digital dividend frequencies would be prejudicial to the outcome of debates over the use of liberated frequency bands, before the debates even begin. Furthermore, the identification of a sub-band would be virtually prevented from subsequent operational implementation if it is not harmonised at the European, or even global level'.

[13] Report for information purposes, performed on behalf of the Economic affairs commission (1), on the current and future responsibilities of France's Electronic Communications and Postal Regulatory Authority, ARCEP (*Autorité de régulation des communications électroniques et des postes*), by Senator Bruno RETAILLEAU - http://www.senat.fr/noticerap/2006/r06-350-notice.html.

Question no. 17: Do you have any comments on the work being performed, particularly the efforts taking place at the European and global level? In your opinion, what specific characteristics of electronic communication services' low frequency band requirements should be underscored, compared to the needs of other services, with respect to accessing digital dividend spectrum?

4. Industry developments and deployment projects in low frequency bands

This section is concerned with industry developments and projects for deploying services in the new frequency bands below 1 GHz that will be identified through digital dividend harmonisation efforts.

It is also aimed at assessing the impact of these harmonisation efforts on French and European industrial policies in the area of electronic communications.

4.1 Impact on industrial policy of early identification of low frequency bands

As the history of GSM has shown us, frequency bands constitute the primary component of an industrial policy for the wireless communication sector.

At the European level, the digital dividend is an integral part of the i2010 programme[14]: *a European Information Society for growth and employment*. This new strategic framework defines broad policy guidelines, aimed at promoting an open and competitive digital economy, and underscoring the role of information and communication technologies and their application to improve social inclusion and quality of life. A cornerstone of the partnership renewed in Lisbon for growth and employment, the i2010 programme will make it possible to devise an integrated approach to the information society and to audiovisual policies in the European Union, based on a common regulatory framework.

In France, the progress report[15] submitted by the working group on the future of the telecommunications sector identifies the digital dividend as one of the key elements for promoting a strong and innovative Europe-wide ecosystem enabling the electronic communications industry to evolve within a more harmonised environment.

Question no. 18: In your opinion, how important is a relatively swift identification of additional low frequency bands for electronic communication services, and particularly the impact of digital dividend harmonisation efforts on industrial policies in France and in Europe?

Question no. 19: What economic impact (employment, turnover, etc.) can we expect the efforts devoted to the digital dividend to have?

[14] http://ec.europa.eu/information_society/eeurope/i2010
[15] http://www.industrie.gouv.fr/pdf/rapport_faure_2007.pdf

4.2 Industry developments in the low frequency bands

The possibility of electronic communication services gaining access to frequency bands below 1 GHz has triggered a new momentum in industry development worldwide.

New equipment construction projects are emerging. For mobile communication services, the UMTS Forum[16] is reporting projects for the development of UMTS at 500 MHz. In the same vein, in the United States UMTS technologies have been developed in the 800 MHz bands.

Meanwhile, the WiMAX Forum[17] is working on developing equipment operating on the 700 MHz bands for delivering broadband wireless access services.

Question no. 20:

a. What is the status of industry developments in the low frequency bands, and what is the roadmap for standardisation efforts?

b. Under a hypothesis of sufficiently early identification of a sub-band in Europe, what systems would be the focus of industrial developments?

The potential deployment of projects in the frequency bands below 1 GHz in Europe depends on manufacturers' capacity to supply equipment adapted to the markets that could emerge as a consequence.

Several factors are likely to enable or, on the contrary, to hamper the product development process, particularly the degree of spectrum management harmonisation between the States.

This harmonisation must make it possible to create a market that is large enough to generate a return on manufacturers' investments.

Question no. 21: How big does the potential market need to be to generate a return on investments made in developing equipment to operate in frequency bands below 1 GHz? How important is the degree of harmonisation between States?

The crucial question nevertheless concerns the degree of visibility that manufacturers must be given in the harmonisation process. The development of equipment will be shaped by future digital dividend harmonisation decisions in France and in Europe.

As a result, setting a time to market for this equipment, and the resulting services that could be deployed, depends directly on when harmonisation decisions are made.

Question no. 22: Under the hypothesis of harmonisation at the European level of a frequency band below 1 GHz, what would be the time to market for equipment? Please specify a response based on a hypothesis of a harmonisation decision at the European and the national level in 2007 or 2008.

[16] http://www.umts-forum.org/
[17] http://www.wimaxforum.org

4.3 Network and service rollout projects

In light of the migration of current systems to ever-increasing speeds, and of the opportunities that identifying new resources in the low frequency bands and resulting industry developments represent, ARCEP is seeking to obtain a more precise view of the network and service rollout projects that could be undertaken in the frequency bands below 1 GHz.

Question no. 23: If harmonised frequencies below 1 GHz were identified, notably as a result of the work currently being performed at the European level (see Section 3), what players would be likely to deploy networks and services in these bands? Within what coverage zone? What type of service would they be likely to offer? What would the business model be? What type of applications can we expect to see develop?

Implementing new projects requires new infrastructure to be deployed, along with the release of devices capable of using the new frequencies that have been made available. The renewal of the current base of devices will need to be adapted not only to the roadmap for making new low frequency bands available, but also to the arrival of new high frequency bands. A strategy that combines several frequency bands could thus help minimise the impact of the equipment replacement issue, provided that the technical integration of multiple frequency band management is realistic.

Question no. 24: How will the design and release of new devices correlate with the deployment of networks on new low frequency bands, and with the introduction of new high frequency bands?

For the electronic communications sector, to ensure that technically and economically viable projects can be deployed in these frequency bands, the critical issue will be having a sufficient quantity of harmonised frequencies at their disposal at the national and European level.

Question no. 25: What quantity of harmonised frequencies, and what technical specificities (duplexing mode, channelisation, etc.) will be required to enable the implementation of viable projects in the frequency bands below 1 GHz?

Frequency band harmonisation efforts could lead to a situation where certain portions of the spectrum would be available in only a fraction of the country, notably in the most sparsely populated areas.

Question no. 26: Would interest in frequency bands below 1 GHz be similar if they were available in only a fraction of the country, notably in sparsely-populated areas?

The timetable for making frequency bands below 1 GHz available depends, above all, on the completion of harmonisation efforts at the European and national level, which will shape industrial developments associated with these bands.

This timetable must be part, first, of a global frequency plan which includes the use of high and low frequency bands, which have already been allocated or identified and, second, take account of the needs of operators and service providers.

Question no. 27: What timetable should be set for harmonising frequency bands below 1 GHz to ensure that use of this spectrum is consistent, first, with a global frequency plan and, second, the needs of operators and service providers? In particular, based on a hypothesis of harmonisation at the European and national level in 2007 or 2008, when are these projects likely to come to fruition?

Aside from the timetable for harmonisation, the roadmap for making frequencies below 1 GHz available could influence project development. In France, the Law of 5 March 2007 sets the target date of 30 November 2011 for the switch-off of analogue broadcasting. The spectrum freed up by this switch-off will not become available until that date, even under the best case scenario.

Question no. 28: To what extent is the development of projects and services using this frequency band affected by changes in the timetable for making low frequency bands available?

Furthermore, uncertainties remain over the ultimate outcome of current harmonisation efforts. A lack of harmonisation could slow and even prevent the development of projects and services designed to employ these frequency bands.

Question no. 29: Should harmonisation efforts fail, to what extent would a differentiated and non-harmonised use of frequency bands below 1 GHz in France's neighbouring countries create an impediment to the development of projects and services using these frequency bands?