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23 May 2022 to 23 September 2022

Preparing the future of mobile networks

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Practicalities of the public consultation

The opinion of all interested parts is solicited on every part of this document. Contributors nevertheless have the option of responding to only some of the questions.

This public consultation will be open until 6 pm Paris time on 23 September 2022. Only contributions received by that deadline will be taken into account.

Contributions must be submitted to Arcep, preferably via e-mail, with the subject line, "*Réponse à la consultation publique "Preparing the future of mobile networks*" to the following address: CPfrequencesmobiles@arcep.fr.

Otherwise, they can be sent by post to the following address:

> Réponse à la consultation publique "*Preparing the future of mobile networks"*
> Direction mobile et innovation
> ARCEP
> 14 rue Gerty Archimède
> CS 90410
> 75613 PARIS CEDEX 12

In the interests of transparency, Arcep may publish some of the responses it has received, excluding any information that is protected by business confidentiality. Contributors whose response contains confidential elements are invited to provide two versions of their contribution:

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- A public version in which passages that may be covered by business confidentiality have been replaced by [BC:…], for instance: "a market share of [BC:…]%".

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Additional information can be obtained by sending your questions to: CPfrequencesmobiles@arcep.fr.

This document is available for download on the Arcep website: www.arcep.fr.

Foreword

The technological developments taking place in today's electronic communications sector are likely to cause tremendous upheavals in terms of both applications and industrial and business models.

As the sector's regulator, Arcep will take these developments into account when pursuing the regulatory objectives set for the Authority by Article L. 32-1 of the French Postal and Electronic Communications Code (CPCE), particularly with respect to regional digital development, fostering investment, innovation and competitiveness in the sector, ensuring fair and effective competition between operators, and the efficient management and use of the frequencies it assigns. The Authority also wants to ensure that these developments align with societal imperatives, notably in the area of environmental protection.

The goal of this consultation is therefore to query all of the parties who use spectrum and the stakeholders concerned by the regulation of access to that spectrum (operators, equipment suppliers, local authorities, service providers and manufacturers, consumers, concerned citizens) regarding the technologies, applications and mobile services that will be developed in the short, medium and long term, and on their needs and the conditions for mobilising the resulting frequency resources. The contributions will help inform Arcep's work on spectrum management and on defining the award procedure for frequencies that are or will become available.

The first part provides a status report on current 5G deployments, and queries stakeholders on the evolution of this technology and of mobile network architectures, and on their own future uses and resulting frequency resource requirements.

The second part is devoted to vertical market players' specific needs in terms of connectivity, and to the different mobile network architectures and business models that are most likely to satisfy them.

The third part focuses on societal needs and the obligations that could be attached to frequency licences in terms of coverage and quality of service, networks' environmental impact and network sharing.

Lastly, **the fourth part** queries stakeholders on the different frequency bands that are or will become available in the medium or long term.

Table of Contents

1 Fostering innovation thanks to 5G and its evolutions

After providing a status report on current 5G network deployments (Part 1.1), this part queries stakeholders on the technology's development (Part 1.2), mobile network architecture (Part 1.3) and, lastly, future applications and use cases and resulting frequency requirements (Part 1.4).

1.1 State of the art in 5G deployment

5G is a new generation of mobile technology, designed to give wireless networks the ability to satisfy greater demands in the areas of speed, latency, coverage and reliability, compared to existing mobile networks.

Over time, 5G is due to be carried on all of the frequency bands used by mobile networks. In Metropolitan France, it is currently used by the four main operators in the 700 MHz, 2.1 GHz and 3.5 GHz bands. Following the assignment of this last band in 2020, operators launched the first 5G plans.

5G coverage has developed chiefly in dense urban areas, but more and more mid-size cities (and even rural areas in the 700 MHz band) now have 5G coverage. Initial estimates indicate that around 70% of the population is now covered for 5G (all frequency bands and operators combined).

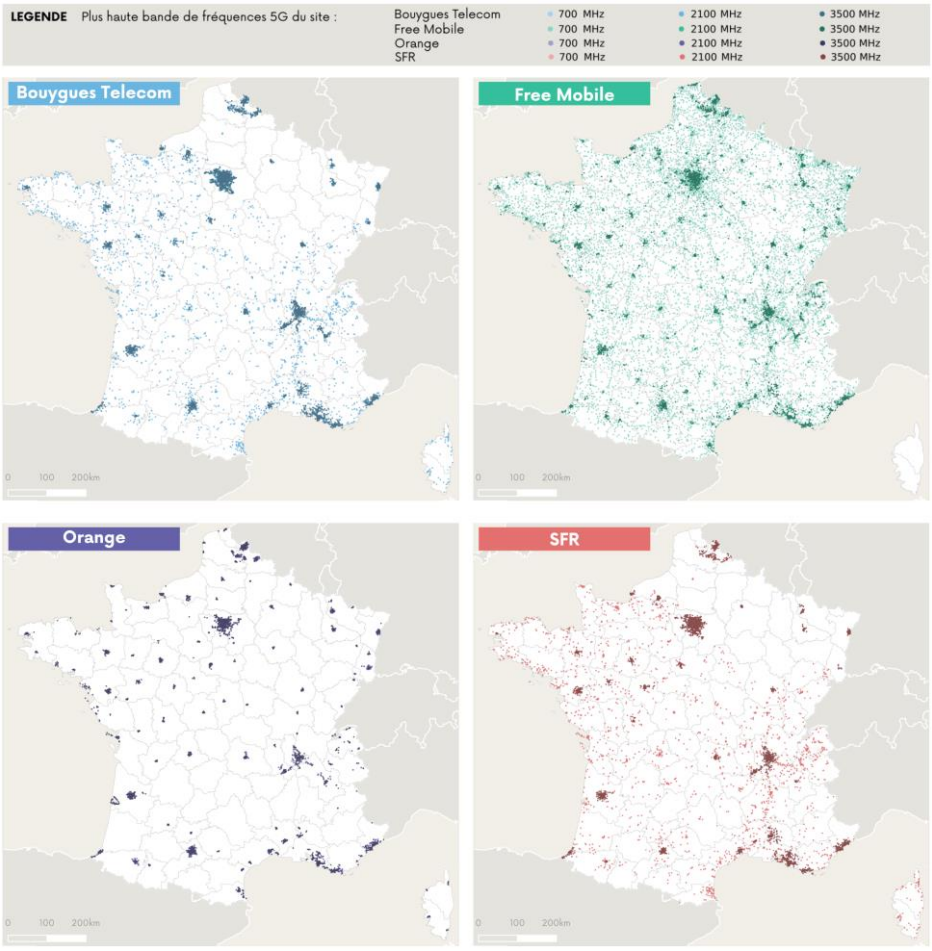
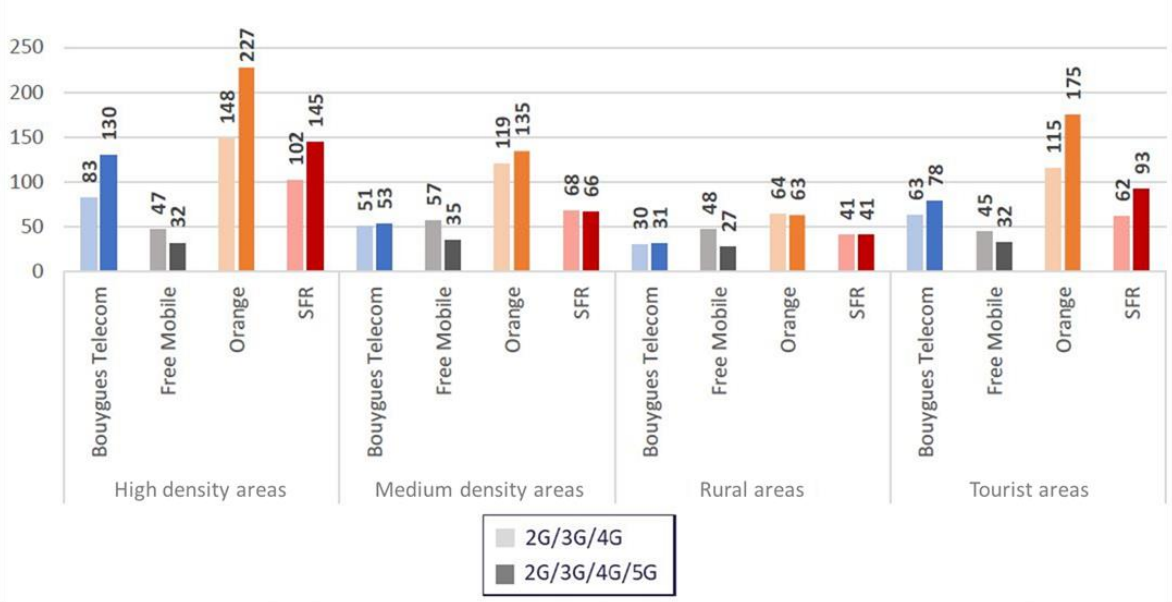


Figure 1 – Map of the different operators' 5G rollouts (*Operator data as of 31 December 2021/Arcep Publication: 31 March 2022*)

As part of its quality-of-service (QoS) audit, Arcep introduced a protocol in 2021 that made it possible to test QoS for a user with a 5G-compatible plan and telephone. The following table presents average download speeds obtained during 5G-compatible tests performed nationwide, by operator and by frequency band. This indicator makes it possible to measure the speeds users can expect for their daily usage, regardless of whether they are actually connected to a 5G antenna.



Average download speeds for users wihout access to 5G (2G/3G/4G) and those with a 5G-compatible mobile and plan (2G/3G/4G/5G) by operator and strata (high density / medium density / rural / tourist)

1.2 5G: a disruptive innovation evolving steadily towards 6G

The first version of 5G deployed on the networks is based on the 3rd Generation Partnership Project (3GPP) release 15 standard, adopted in 2019, which defines several types of deployment.

a) Non-Stand Alone (NSA) 4G core deployment

5G deployment with this solution is gradual and allows existing networks to evolve to 5G in a flexible fashion. 5G is deployed in addition to an existing 4G network or a network deployed concurrently. 4G radio access remains the anchor point and the vehicle for communication control signalling, while the user plane traffic is shared between 5G and 4G radio access, via dual connectivity which enables the aggregation of 4G and 5G carrier bandwidth.

This solution thus makes it possible to eliminate the need to deploy a new 5G core network at the outset, by taking advantage of the performance gains enabled by the 5G radio interface, albeit without the expected benefits of a 5G core network, notably slicing.

This is the type of deployment in place today on public networks.

b) Stand Alone (SA) 5G core deployment

In this configuration, 5G is deployed as part of a new end-to-end network, including base stations and core network (in some cases parallel to the existing network).

There is no interaction between the 5G network and existing networks, aside from the ability to switch from one to the other via intersystem handover procedures.

In theory, this end-to-end solution will deliver all of the expected leaps in performance. Still in the trial stage, it could be available in Metropolitan France starting in 2023.

c) New versions, additional features and future standards

Standardisation bodies have continued to work on developing 5G since 2019, by adding new features to address a larger set of applications and use cases, notably Machine-to-Machine and critical applications (in terms of reactivity and reliability). 3GPP published a major development in 2020 with Release 16 and has two more major publications planned: Releases 17 and 18 in 2022 and in 2023-2024, respectively. This last one, called "5G-Advanced", is expected to trigger a paradigm shift.

In addition to which, research has already begun on 6G, with standardisation expected to be finalised around 2028-2029.

At the same time, Wi-Fi wireless connection technologies that use unlicensed spectrum dedicated to the RLAN (Radio Local Access Network)[1], also continue to be developed to deliver ever more powerful performances. The Wi-Fi 7 standard is currently being developed by the Institute of Electrical and Electronics Engineers (IEEE) and expected to become available by 2024, providing improvements in indoor Wi-Fi latency and speeds.

Question 1. What are the most significant developments brought by 5G Release 16 and Release 17? What is the timeline for these developments to become available on networks and devices? If applicable, what new frequency requirements will these developments generate?

Question 2. Same question for Release 18 ("5G Advanced"), 6G and Wi-Fi 7.

Question 3. Have you identified other developments in mobile technologies for specific uses that could generate new frequency needs, e.g. communications between devices or broadcasting/multicasting? If so, which and for what uses?

1.3 Developments in mobile network architectures

Alongside these developments, new network architectures are emerging which could alter their industrial and technical models. Virtualisation, open architecture (Open RAN) initiatives and edge computing in particular have the capacity to change the way in which networks are deployed and operated. A large number of stakeholders could potentially be involved in the process, whereas traditionally a small group of players provided and operated the network in its entirety.

Question 4. As an operator or business, to what extent do you plan on integrating these open architectures in your network deployment strategy? More specifically, in what context and to satisfy what requirements do you consider it advisable to introduce edge computing in mobile networks? What issues, in particular pertaining to access, deployment characteristics and usage, have you identified? How do they need to be handled?

Question 5. In what ways do these architectural changes require (if any) changes to how access to spectrum resources is managed (frequency licence holders' identity, quantities assigned, etc.)?

Question 6. In what ways could these architectural changes (notably decentralisation and edge computing, Open RAN, etc.) hamper or accelerate network sharing? What competition issues might arise as a result?

[1] These frequency bands are not subject to the system of individual licences and can therefore be used freely provided they comply with the technical terms and conditions specified for their use.

Question 7. What network security consequences might arise with these architectures? If applicable, what measures would need to be taken to address them?

1.4 Expected applications and required features

Mobile networks, both public and private professional ones, provide a set of services designed to support use cases and applications and satisfy the needs of their users.

These different use cases and applications include:

- Interpersonal voice (or video) communication;
- internet access;
- massive data transfers to users;
- video distribution and capture;
- uploading sensor data;
- symmetric communication for a large number of small data streams between machines;
- real-time interactivity (gaming, remote control, metaverse…);
- ultra-reliable, low latency, mission-critical communication.

Question 8. What other expected future applications and features can you identify?

Question 9. Which markets would be targeted by these applications? What is their development outlook and timeline?

Question 10. Among these applications, are some more likely to develop specifically within a fixed environment, e.g. indoors, or rather in a mobile situation? If so, for what reasons?

Question 11. If applicable, which new mobile technologies would be needed to cover all of these applications? To cover your applications as a user?

Question 12. What new frequency requirements have you identified to enable these applications using existing technologies and, if applicable, with the introduction of new technologies? For what reasons (capacity, speed, coverage...)?

2 Vertical market players' specific and emerging needs

5G promises a technological leap in performance that will open the way for new applications and use cases, notably for "vertical" players, i.e. all private sector businesses (regardless of their field of activity) and public sector structures that are end users of electronic communication services. 5G creates the ability to design solutions tailored to these players' particular needs (latency, managing multiple objects, bespoke coverage…).

After providing an inventory (Part 2.1) of the frequency resources that are already available to verticals, this section is dedicated to examining their connectivity needs (Part 2.2) and the different network architectures (Part 2.3) and business models likely to satisfy those needs (Part 2.4).

2.1 Inventory of the frequency resources available to verticals

Verticals (aka vertical market players) have the ability to ask mobile operators for dedicated services on public networks, notably 5G services. These networks will begin to reach their full potential with the deployment of 5G core networks, expected in 2023.

Today, verticals can be assigned frequencies in different bands at the local level. The following table summarises the frequency bands available to verticals for deploying professional mobile networks (PMR), and the number of current authorisations.

Frequency band	Type of award (authorisations' maximum duration) and trial platform launch	Total available spectrum	Number of current authorisations
2.6 GHz TDD	Long-term (up to 10 years) Platform open since 9 May 2019	40 MHz	21
	Experimental Authorisations issued since 2016	40 MHz	25
3.8 – 4 GHz	Experimental Platform open since 14 March 2022	100 MHz	3
26.5 – 27.5 GHz	Experimental Platform open since 16 January 2018	800 MHz	Around 20

2.2 Innovation and economic development

5G constitutes a major technological disruption, due to its performances (latency, speed, reliability and massive object connection capabilities), but also its features. Network slicing – i.e. the ability to create multiple individual virtual networks (slices) on the same physical network, to provide services with different quality levels – opens the way for new business applications on public mobile networks.

These features pave the way for new services designed to meet specific needs, such as those of smart territories, for controlling reconfigurable manufacturing systems, predictive maintenance, augmented reality or autonomous vehicles. These applications may be either long-term (e.g. in a production plant) or relatively temporary (e.g. on a construction site or for a local event) and, for a business, depend on their sector of activity, digitisation strategy and size.

Question 13. What outlook does 5G offer for France's economic and industrial fabric? To what extent will the expected advances (lower latency, massive number of connected objects, faster speeds) be necessary to enabling all of the technology's planned business applications? What size market do these advances represent? What economic benefits can be expected from verticals' appropriation of these new services, in general, and/or by your sector in particular?

Question 14. What might be some of the specific situations that would require temporary access to spectrum resources (construction sites, special events)?

Question 15. What are the specific needs of entities that operate in several countries? What specific needs, if any, do you attribute to micro, small and medium enterprises? What might be the issues surrounding the frequency resources they require (quantity of spectrum, associated QoS, etc.)?

2.3 Different possible technical solutions

As technologies and needs evolve, particularly with the introduction of network slicing and local breakout[2] features, the dividing line between private and public networks could become blurred. As a result, several deployment scenarios may be envisioned to satisfy verticals' needs:

- private standalone network*;*
- operated network (dedicated use of public networks, e.g. via network slicing);
- hybrid network (network where some components are part of public networks, and some are privately owned).

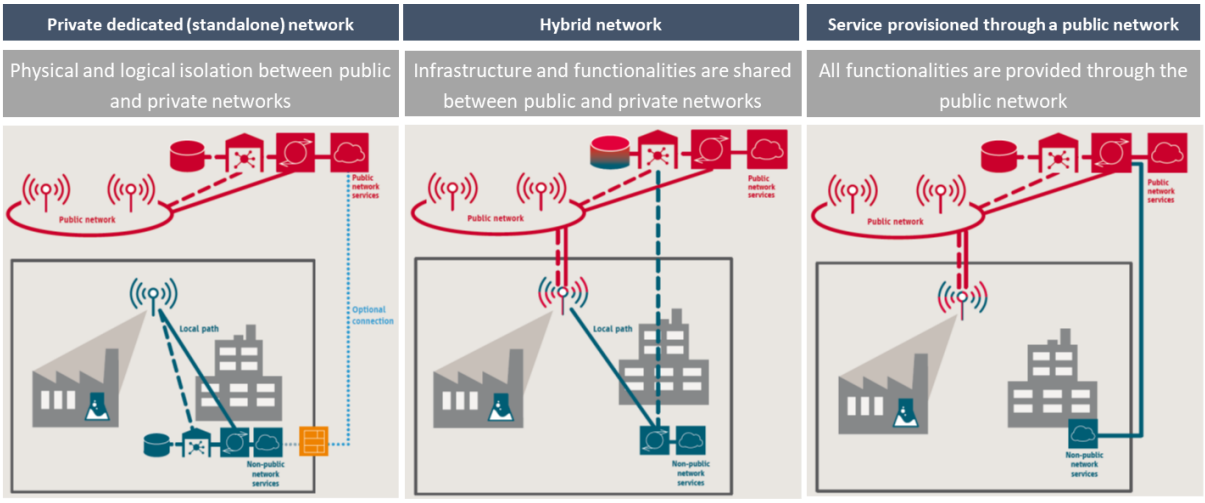


Figure 2 The different deployment scenarios to meet verticals' needs

Each of these solutions appears to have its own set of pros and cons, depending on requirements (number of users, traffic, performance level and availability demands, whether or not additional coverage is required on top of what public networks provide, local or wide area coverage, etc.), players'

[2] Local internet breakout is a connection to the internet via the access point closest to the customer (typically located on the customer's information system). Unlike a classic remote access solution, internet interconnection via a local breakout means that traffic no longer has to travel over an operator's wide area network (WAN), and remains within the customer's own local system, thereby reducing data processing latency.

investment capacity, access to spectrum resources and the conditions governing their use. Furthermore, different types of player can contribute to these deployments, depending on the chosen solution.

Question 16. For each of the three types of network listed above, which seems the most able to support which applications and satisfy which needs? What are the requirements and prerequisites that would ensure that using these types of networks would satisfy these needs? Which frequency bands are best suited to satisfying these needs? Which players could provide these solutions?

Question 17. Regarding hybrid networks, why might the combination/complementary nature of the two types of network be needed (resilience, supplementary coverage, network access continuity, etc.)? What hybridisation schemes (distribution of the elements/features between private and operated network) would be best suited to meeting the needs and supporting the applications identified above (e.g. access on the public network, private core)? What role does access to frequencies play in these different schemes?

Question 18. Still on the matter of hybrid networks, what types of player could position themselves to contribute to the different hybridisation schemes? What business models could be created to provide this type of solution (e.g. neutral host model)?

2.4 Changes to the ecosystem to satisfy verticals' needs

The disaggregation of the different building blocks (frequencies, radio access network, core network and services) that make up a typical Business to Business (B2B) solution is taking place parallel to the emergence of new business activities capable of acting as intermediaries along the value chain between these different building blocks. These new activities increase the number of potential technical-economic models for satisfying a vertical's needs.

These include:

- Players providing passive or active network infrastructure (infrastructure operator or augmented infrastructure operator) or web hosting companies;
- Integrators in charge of network integration or operating the network and providing the service;
- Demand aggregators that acquire spectrum or network capacity (slices) then resell them by the slice, acting as brokers for vertical customers.

This form of intermediation is especially well suited to situations where certain players (e.g. small businesses) do not have the resources needed to deploy and operate their own network, for technical, operational or economic reasons.

Question 19. Do you share this analysis of intermediation trends, and have you identified any others? How do you foresee the ecosystem's development around these different models? What are the pros and cons of the different models?

Question 20. Which of the ecosystem's players are in the strongest position to obtain frequency licences? For what reasons?

3 Societal needs and frequency licence obligations

This part details users' needs and the categories of obligation, including coverage and quality of service (Part 3.1) and environmental sustainability (Part 3.2), that could, if warranted, be attached to future frequency licences. Lastly, stakeholders are queried on the possibilities for and conditions governing network sharing (Part 3.3).

3.1 Public network coverage and quality of service

Frequency licence holders are currently subject to obligations that contribute to the networks' development and to strengthening the quality of service they provide:

- obligations to emerge from the New Deal for Mobile resulted in the implementation of a "targeted coverage mechanism" that seeks to increase network density, including an obligation to provide 99.8% of the population with "good" voice/SMS coverage, as well obligations to provide on-board coverage for vehicles along 60,000 kilometres of priority roadways[3];
- 700 MHz band frequency assignments in the French overseas territories included an obligation to cover certain areas that were identified beforehand in concert with local authorities;
- Licences in the 3.5 GHz band introduced obligations:
    - First, to provide a maximum theoretical downstream speed of at least 240 Mbit/s from 100% of mobile operators' cell sites by 2030;
    - Second, for each operator to deploy at least 10,500 sites using the 3.5 GHz band by the end of 2025.

  They also increased coverage obligations for roadways, with an obligation to provide mobile access with a maximum downstream speed of at least 100 Mbit/s (in 4G+ or 5G) over 70,000 kilometres of road, either motorways or main trunk roads, by the end of 2027; of these 70,000 kilometres, the 16,000 kilometres of motorway must also have 5G coverage by the end of 2025.

The Arcep website[4] tracks all of the voice/SMS and superfast mobile network deployment obligations, for each operator. The 2022 edition of Arcep's "Connected Territories" report also included a scorecard of mobile voice/SMS and superfast mobile access (4G and 5G) as of late September 2021[5].

[3] *Priority roadways are defined in frequency licences awarded to mobile network operators in Metropolitan France as: "motorways, the main trunk roads in each department connecting the department's administrative centre (prefecture) to the district administrative centres (sub-prefectures) and the stretches of road where an annual average of at least five thousand vehicles travel daily, as of 1 January 2018. If several roadways connect the department's administrative centre (prefecture)* to the district administrative centres *(sub-prefectures), the licence holder is obligated to cover at least one of them".*

[4] https://www.arcep.fr/la-regulation/grands-dossiers-reseaux-mobiles/la-coverage-mobile-en-metropole/le-suivi-des-obligations-de-deploiements-des-operateurs.html

[5] https://www.arcep.fr/uploads/tx_gspublication/RA2022-TOME2-territoires-connectes_mars2022.pdf, page 34.

3.1.1 General questions

Question 21. What are the essential consumer and business services provided by mobile networks (web browsing, video calling, email, instant messaging, streaming, etc.)? Do users have difficulty accessing these services and, if so, which ones and under what circumstances (particular location, rarely/often in rural areas, rarely/often indoors, while mobile, on transport corridors…)?

Question 22. What are the key performance indicators needed to assess the quality of the services mentioned? Have you seen changes in quality over the past several years?

Question 23. Drawing a distinction between consumer and business use, what needs might not be met by the combination of existing obligations? Can you identify any other levers to guarantee deployments that satisfy these needs? If so, what would be the most appropriate methods for applying them?

3.1.2 Specific questions on indoor coverage

To improve indoor coverage, in the frequency licences awarded as part of the New Deal for Mobile, and the assignment of the 3.5 GHz band, Arcep introduced obligations regarding:

- The inclusion of voice and texting over Wi-Fi services in all plans;
- A guarantee to connect Distributed Antenna Systems (D.A.S.) installed by third-party enterprises to operators' networks;
- Indoor small cell sharing between operators.

Question 24. What developments are expected in indoor use? What technical solutions and business models (e.g. neutral host) would be the most appropriate to meet requirements? What types of player would be most likely to deploy them? What competition, technical, regulatory or other type of issue would these solutions and business models create?

Question 25. What additional frequencies could help satisfy indoor coverage and quality of service needs, and how? In particular: is the 26 GHz band well suited to *ad hoc* and indoor solutions? Given their propagation properties, could the 450 MHz and 1.4 GHz bands enable indoor coverage gains via mobile networks? What other frequencies could be considered to address this need for improved indoor coverage?

Question 26. What role does Wi-Fi play in all of the solutions for providing service indoors? If applicable, are there uses for which Wi-Fi is not technologically appropriate, and for what reasons?

3.1.3 Questions on fixed wireless access

In addition to mobile systems, fixed wireless access (FWA) networks can be used to provide superfast access, particularly in areas where fibre to the home/building (FttH/B) is not yet available.

Fixed wireless access can also be useful for businesses and consumers wanting a back-up connection to guarantee uninterrupted internet access should their main wireless connection break down.

The New Deal for Mobile includes several 4G FWA obligations:

- an obligation to provide a fixed 4G service, particularly in those areas identified by an Order from the Minister responsible for Electronic communications[6]. Operators are required to provide this service in these areas once they are covered by their 4G network, except in duly justified cases of insufficient capacity to ensure satisfactory quality of service for mobile users;
- For Orange and SFR, an obligation to participate in the 4G FWA coverage extension scheme: each operator is required to provide a 4G FWA service in a maximum 500 of the areas identified by the Order from the Minister responsible for Electronic communications, thanks to the installation of new 4G cell sites. 479 areas have been identified to date[7].

Licences in the 3.5 GHz band also include obligations regarding the provision of fixed internet access solutions on the network deployed in the 3.4 – 3.8 GHz band and the continuity of the fixed internet service for users accessing it on a superfast FWA network, whose switchoff is scheduled for 2026. These obligations are designed to ensure the availability of a fixed internet access service in some territories where fixed line speeds are insufficient.

Question 27. Do you consider existing provisions to be sufficient and satisfactory? In particular, do you believe it will be necessary to introduce new provisions to ensure the widespread availability of superfast access and/or to enable a wireless network back-up for those users that want one their fixed network connection? Do you have any proposals to make?

Question 28. Regarding business application requirements, have you identified any needs other than the one listed above, for a back-up connection to guarantee continuity of service when a service interruption occurs? What provisions would you like to see introduced?

3.2 Digital sustainability

More and more attention is being paid to the environmental impact of digital communication networks, devices and service use. As the digital carbon footprint is becoming a growing source of concern, Arcep has begun work on this issue through its "Achieving digital sustainability platform," with the goal of making environmental issues and a challenges the focus of a new regulatory chapter. To this end, managing spectrum resources, and particularly the assignment of new resources, requires careful consideration and raises additional questions.

Question 29. Do you have any proposals (levers for action, means, strategies, etc.) to share regarding spectrum management or frequency assignments that would help reduce networks' environmental impact, and help promote digital sustainability in general? What demands or prerequisites would be needed to activate this lever, if possible (availability of data, methodological consistency, monitoring/*a posteriori* audit, etc.)?

Question 30. As an operator or business, do you have an environmental or greenhouse gas reduction strategy within your organisation? Does it have a network or digital component? What tools and what methodology do you use to monitor compliance with this strategy? In what way does the request for and use of frequencies play a role in this strategy?

[6] For instance, the Order of 23 December 2019 defining the areas where mobile radiocommunications operators are required to provide a fixed internet access service on their superfast mobile network:

https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000039682956

[7] Further information can be found on the New Deal for Mobile dashboard's "4G FWA" page: https://www.arcep.fr/cartes-et-donnees/tableau-de-bord-du-new-deal-mobile.html#4GFixe

Question 31. For each of the frequency bands mentioned in Part 4, have you identified positive or negative environmental effects resulting specifically from the use of these frequency bands?

3.3 Network sharing

Network sharing is a subject that is attracting a growing amount of attention amongst members of the public, not least because of how it can help protect the environment and preserve the country's natural and landscape heritage. Provisions contained in the French Postal and Electronic Communications Code (CPCE) encourage operators to favour solutions based on sharing an existing cell site or tower. Obligations to share active installations or, in some cases, simply passive infrastructures were imposed on operators as part of the terms attached to their frequency licences. For instance, the New Deal for Mobile's targeted coverage mechanism for Metropolitan France stipulates that:

- If the area is the target of a coverage obligation for all four operators and if, on the Order's date of publication, none of them is providing a mobile service with "good coverage," operators are subject to a network sharing obligation (tower and active equipment sharing);
- The remaining areas are subject to an obligation for at least passive infrastructure elements to be shared (i.e. tower sharing) between operators designated by Order in that same area.

Question 32. How can frequency award strategies contribute to infrastructure sharing? Beyond the existing framework, what specific mobile network sharing measures could be useful for future deployments? In which frequency bands and for what reasons?

The deployment of small cells, notably in urban areas, raises sharing-related questions, particularly when the deployment occurs on certain scarce physical infrastructure owned by public authorities, such as urban furniture (lampposts, traffic signs, traffic lights, billboards, etc.[8]).

Question 33. In what environment (for instance: indoor/outdoor, densely/less densely populated, etc.) would small cell sharing be the most appropriate? For what gains? On the flipside, in which environment would it be the most problematic? What competition and/or strategic issues surrounding small cell sharing can you identify?

[8] Article 8 of Order No. 2021-650 of 26 May 2021 regarding transposition of Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code and pertaining to the measures adapting the powers of the Regulatory Authority for Electronic Communications, Postal Affairs and Print Media Distribution

4 Specific questions by frequency band

In this part, each section examines a different frequency band with specific questions. These bands are all at different degrees of harmonisation within international bodies, and their actual availability date will differ:

- **The 1.4 GHz, 26 GHz, 3410 – 3490 MHz, 2.1 GHz FDD and TDD, 3800 – 4200 MHz, 700 MHz SDL** and **66 – 71 GHz bands** have already been harmonised at the European level and, except for the last one, could be part of a spectrum assignment procedure in the near future (**Part 4.2**);
- **The 42 GHz and 450 MHz bands** are still in the process of being harmonised at the European level (**Part 4.3**);
- Lastly, **the 470 – 694 MHz, 6425 – 7125 MHz bands and bands above 90 GHz** are only candidates for international harmonisation for mobile use (**Part 4.3**).

The first section (**Part 4.1**) looks at spectrum sharing aspects between users for the same frequency band.

Question 34. Of all the frequency bands listed above and detailed below, which rank highest for their ability to meet your needs?

Question 35. Have you identified any other frequency bands that warrant consideration for mobile services in the near future?

4.1 Frequency sharing and local spectrum assignments

Some frequency bands that are already available or will be in the near future are in higher and higher ranges, which means they have a physically limited range and can thus be more easily used by geographically distinct networks without any major risk of harmful interference. As a result, "secondary" use of frequencies[9] and highly local assignment procedures emerge as easier, and even more relevant solutions for achieving optimum use of the spectrum.

Question 36. Among the frequency bands that are the subject of questions below, which would seem to be the most appropriate for local assignments? For reuse for secondary purpose?

Question 37. If applicable, if these frequency bands were used for coexisting mobile and other uses (satellite, fixed link …), what sharing methods seem advisable to you?

[9] Secondary use of frequencies is possible when a new player is authorised to use frequencies, within a specific zone, that have already been assigned to a primary licence holder, in a situation where the latter does not actually use those frequencies within that zone.

4.2 Frequencies harmonised at the European level that could be assigned in the short term

4.2.1 The 1427-1517 MHz (aka 1.4 GHz) band

The entirety of the 1.4 GHz band, or 90 MHz in all, has been harmonised at the European level[10]. It is divided into 18 blocks of 5 MHz. Meanwhile, 3GPP has defined the 1.4 GHz band for use as a 4G Supplemental Downlink (SDL, only downstream from the antenna to the device) and 5G SDL[11].

There are therefore 90 MHz in this band to be assigned to mobile services. They are made up of:

- a core band of 40 MHz (1452 – 1492 MHz), available in Metropolitan France since 1 January 2022;
- two extension bands of 25 MHz each, situated respectively above (1492 – 1517 MHz) and below (1427 – 1452 MHz) the core band. The first will become available on 1 January 2023 and second, in most of Metropolitan France, on 1 January 2024.

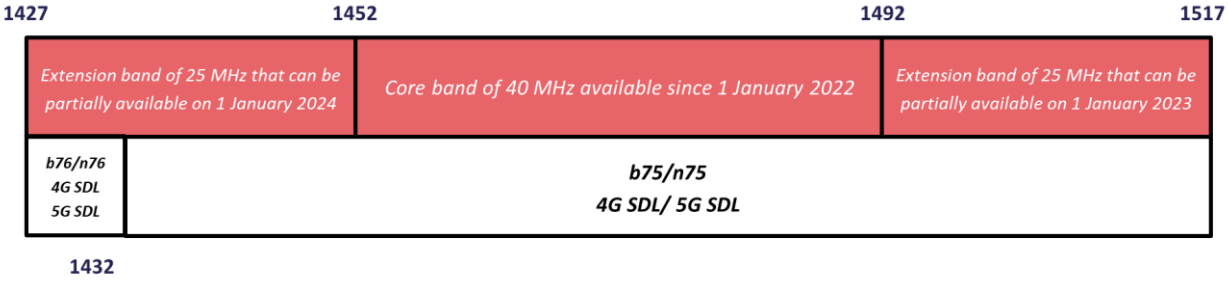


Figure 3 – The 1.4 GHz band arrangement with its availability dates and 3GPP nomenclature

a) Restrictions on using extension bands

For the 1427 – 1432 MHz block

According to Report 65 of the European Conference of Postal and Telecommunication Administrations (CEPT), the 1427 – 1432 MHz block, which will be available from 1 January 2023, will only be able to be used by low-power base stations, to comply with the emissions cap protecting radio astronomy stations in the 1400 – 1427 MHz band.

Question 38. In light of this long-term restriction, do you consider it relevant to offer this block up for assignment?

For the 1492 – 1517 MHz block

The frequency band above 1518 MHz is dedicated to mobile satellite services (MSS). In France, the company Inmarsat is authorised to use frequencies in this band. Use of the 1492 – 1517 MHz sub-band

[10] Following the CEPT adoption of the revision of Decision ECC/DEC/(13)03 and of report 65, the European Commission adopted Decision 2018/661 of 26 April 2018 amending Decision 2015/750 which harmonises the entire 1427 – 1518 MHz band for use in SDL mode.

[11] The b75/n75 (1432 – 1517 MHz) and b76/n76 (1427 – 1432 MHz) sub-bands are defined for 4G SDL/5G SDL use and the b32 (1452 – 1496 MHz) sub-band is defined for 4G SDL use only.

by mobile terrestrial equipment is likely to cause interference for the services that use frequencies above 1518 MHz, namely mobile satellite communication services.

Under these conditions, the Electronic Communications Committee (ECC) report 299 adopted by the CEPT ECC in March 2019 identified two distinct phases of coexistence and defines the power thresholds that each must comply with. In Phase 1, whose point of departure is the presumption that current Inmarsat terminals are not resistant to interference, then Phase 2 which begins after the replacement of all of these devices, which will therefore be more capable of handling coexistence with mobile networks in the 1492 – 1517 MHz band. The transition to "Phase 2", via the replacement of the entire inventory of Inmarsat terminals installed onboard commercial airlines, could take ten or more years.

To enable these services to coexist, this report proposes that administrations impose a cap on the power density levels of mobile SDL base stations located near ports and airports, and thereby restricting mobile deployments around these zones. The affected base stations are, during Phase 1, those transmitting in the 1492 – 1517 MHz sub-band, then, in Phase 2, only those transmitting in the 1502 – 1517 MHz sub-band.

Question 39. What impacts could these respective thresholds have on potential uses of the 1.4 GHz band and the deployments you might plan?

Question 40. Do the deployment restrictions mentioned above constitute a real impediment to the use of the frequencies in the 1492 – 1517 MHz (in Phase 1) and 1502 – 1517 MHz (in Phase 2) sub-bands and, as a result, the desire to apply for a licence to use these frequencies? If applicable, what would be the relevant date for taking Phase 2 thresholds into account?

Other restrictions

A small number of microwave transmission services will, exceptionally, continue to use the 1427 – 1452 MHz sub-band, even after 1 January 2024.

Question 41. Does this situation require particular rules to be put into place to ensure the coexistence between these microwave transmissions and mobile networks using the 1.4 GHz band? If so, what might these rules be?

b) Technical aspects

Because the 1.4 GHz band is only available in SDL mode, it needs to be paired with another band that can be employed for the uplink to be useable by mobile services.

Question 42. Given the standardised protocols, and available equipment and devices, what current or future frequency bands could the 1.4 GHz band be paired with, depending on the technology (4G, 5G …) and the sub-band being considered (core band or complete band)? If applicable, please specify the availability timetable of these protocols, equipment and devices enabling this utilisation.

Question 43. What speeds will be possible in this band without carrier aggregation?

Question 44. Given the carrier aggregation possibilities provided by existing and forthcoming protocols and equipment in this band, what is the maximum bandwidth by channel (in MHz) that can be used in the 1.4 GHz band, depending on the technology used (4G, 5G …)? If applicable, what are the intra-band carrier aggregation scenarios permitted by the standards, and what is the timeline for the availability in equipment? What speeds can be achieved depending on the quantity of spectrum and carrier aggregation scenario used?

Question 45. Will currently available or forthcoming equipment make it possible to share active installations (for instance via Multi-Operator Core Networks) in the 1.4 GHz band? How would this sharing occur in the case of already shared networks? Would there be any particular difficulties?

c) Applications

The 1.4 GHz band could enable:

- Increased mobile speeds in rural and urban areas;
- Increased speeds for fixed 4G/5G;
- extension or improvement to mobile coverage and 4G/5G coverage.

These different outcomes depend in part on the strategy chosen for how to use the 1.4 GHz band, notably the technology employed and deployment scenario chosen (existing or new sites).

Question 46. Among the uses listed above, can you specify which seem the most relevant to you, in particular given the need to pair this band with another frequency band, and the available technologies and, if applicable, as an operator, your network's current and future planned coverage?

Question 47. Can you identify any other uses for this band? Using which technologies?

Question 48. For each of these uses, please specify the quantity of 1.4 GHz band frequencies that would make it possible to develop that use in an optimal fashion.

Question 49. What complements to superfast coverage, notably fibre to the home (FttH), could be provided by using the 1.4 GHz band for fixed 4G/5G services?

Question 50. To what extent are the different uses listed above achievable and relevant for a "like for like" network, in other words only by installing new equipment at existing mobile sites, or planned for the medium term?

Question 51. Can use of the 1.4 GHz band replace use of an existing band, or would it necessarily be added to the frequencies that operators can already use? Would it encourage the phasing out any technology?

Question 52. Does the fact that this band needs to be paired with another band encourage the use of sleep mode or the shutdown of its transmitters?

d) Award timetable and procedures

The availability dates of the core band (since 1 January 2022) and the upper (starting 1 January 2023) and lower (starting 1 January 2024 in most of the country) extension bands differ slightly.

Question 53. Do you consider it advisable to assign all of the 1.4 GHz band frequencies simultaneously?

Question 54. As an operator, what quantity of 1.4 GHz band frequencies would you like to be authorised to use? Do you have a positioning preference for the frequencies in this band?

The physical properties of the 1.4 GHz frequency band, particularly its range and traffic capacity capabilities, make it an interesting candidate for providing a fixed wireless access (FWA) service, notably in rural areas. Depending on the population density, the appeal of these frequencies will not necessarily be the same. This therefore raises the question of award procedures that are tailored to these differences, notably to enable the implementation of a high quality FWA service.

A first option would be to assign the frequency band in a "classic" fashion, e.g. by assigning the band by blocks of 10 MHz, with a set cap for all of the candidates.

A second option would consist of assigning, at least in the more sparsely populated parts of the country, the entire frequency band to one or two licence holders (in which case each would have 45 MHz), carrying ambitious coverage and service provision obligations. This option would enable the licence holder(s) to supply high downstream speeds. It would also limit the environmental impact of these deployments. Hosting and roaming obligations could also be introduced to ensure other operators' needs are met, as well as fair competition between operators.

Question 55. What, in your opinion, would be the pros and cons of each of these two options? Do you have a preference for one or the other? For what reasons? Do you see any other options? Regarding the first option, what would be the appropriate size of the blocks to be assigned? Regarding the second option, what obligations, in your opinion, would need to be introduced, notably with respect to hosting other operators?

4.2.2 The 24.25 – 27.5 MHz (aka 26 GHz) band

In its Opinion of 9 November 2016 on 5G frequencies, with a view to their pioneer use in Europe by 2020, the Radio Spectrum Policy Group (RSPG) underscores that frequency bands above 24 GHz would be necessary to guarantee 5G performance targets, notably data speeds of several gigabits per second. It recommends using the 26 GHz band (24.25 – 27.5 GHz) as the "pioneer" band.

Question 56. What use cases do you expect from this frequency band? Can you identify any obstacles to their deployment?

This band has been harmonised on the European level[12] as follows:

- The band is made up of 200 MHz blocks;
- It is possible to define smaller blocks, in multiples of 50 MHz, and adjacent to one another to use the whole of the available band;
- Thus-defined blocks can be shifted, by 10 MHz increments, if necessary, to accommodate other applications in the band.

For its part, 3GPP defined the whole of this band for 5G TDD use.

Question 57. What minimum bandwidth do you believe is appropriate to operate a mobile network and provide the applications enabled by this frequency band?

Question 58. Can this frequency band be deployed in a network without this same network having to use other lower frequency bands (anchor points)? If not, why not, and what other frequency bands would be necessary, in 5G NSA and 5G SA?

[12] Decision 2020/590 of 24 April 2020 of the European Commission taken based on Decision ECC/DEC/(18)06 of 6 July 2017 and CEPT Report 68

Current 26 GHz band users and procedures for releasing the band

The following diagram depicts the services currently deployed in and around the 26 GHz band.

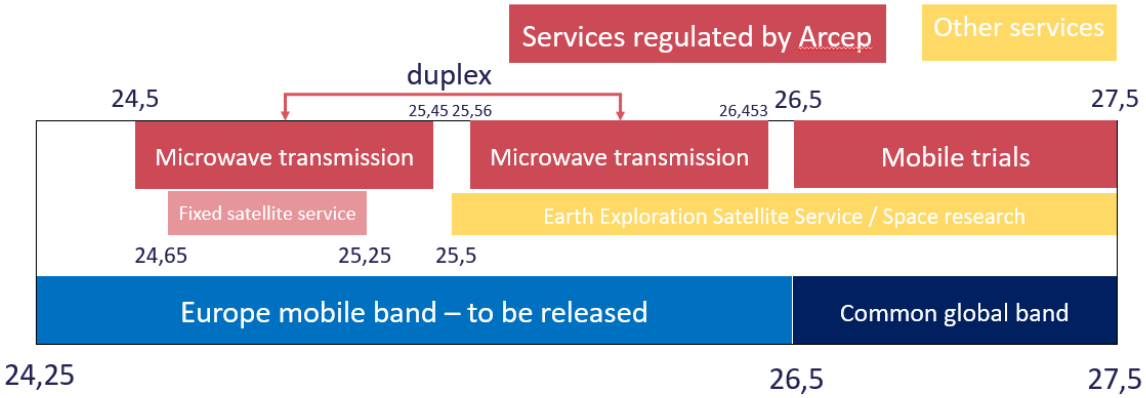


Figure 4 – Distribution of current services in the 26 GHz band

As harmonised by European Decision No. 784/2019/EC, the 26 GHz band is broken down into two parts that differ in their degree of harmonisation at the international level, and their current use in France. The section situated between 26.5 and 27.5 GHz has been harmonised globally for mobile services by the International Telecommunications Union (ITU) Regulation. This upper range of the band (26.5 GHz – 27.5 GHz) is currently available in France.

The section of the band situated between 24.25 and 26.5 GHz is currently used in France by multiple microwave transmission services, which form a mesh across virtually the whole of Metropolitan France. Numbering around 4,400 today, they are used chiefly by mobile operators for mobile network antenna backhaul networks. The first outputs from technical working groups[13] dedicated to this topic suggest that preventing interference for antennas' microwave transmissions on these same frequency bands requires an exclusion zone ranging from 10 to 50 km.

As a result, Arcep decided and announced in a press release dated 30 July 2018 that no licence renewal would be granted beyond the end of 2023 for microwave transmission. One of Arcep's particular goals for this consultation is to gather stakeholders' feedback on the feasibility and procedures for migrating these microwave transmission services to other frequency bands or towards other technologies. Alternative scenarios for releasing the frequency band could also be considered, for instance one consisting of migrating only microwave transmission services from one part of the band, or to migrate only microwave transmission services from certain geographic areas.

Question 59. What is your preferred timeline for the assignment of this frequency band? In the short/medium term, does the assignment of the sub-band ranging from 26.5 to 27.5 GHz seem sufficient to support the use cases you have identified?

Question 60. Do you share the conclusion on the difficulties of cohabitation between mobile services and microwave transmission in the sub-band ranging from 24.25 to 26.5 GHz?

[13] ECC Report 303, Guidance to administrations for Coexistence between 5G and Fixed Links in the 26 GHz band ("Toolbox")

Question 61. What do you think about the existing timetable for releasing microwaves currently occupying the above-mentioned band? What would be a reasonable timeline for migrating the band's microwave transmission services? Do you think the release deadline is appropriate and, if not, what timeline do you believe is preferable? Do you think that conditions specific to this frequency band need to be set forth for this release?

Additionally, the section of the band ranging from 24.25 to 26.5 GHz is used to provide fixed satellite services.

Question 62. What scenarios for cohabitation between fixed satellite services and mobile services would be feasible?

Award procedure

Given the 26 GHz band's intrinsic physical properties, and particularly the short range that enables local deployments, local spectrum assignments that create the ability to satisfy the needs of specific projects could be relevant. As a result, a national, local or hybrid assignment model could be designed, possibly differentiated depending on the different parts of the band.

Here, it is worth mentioning that these different assignment models have already been implemented in other European countries, without any one single preference emerging. Italy opted for national assignments with a band width of 1 GHz (26.5 – 27.5 GHz) awarded in five blocks of 200 MHz. Each of the licence holders of one block can nevertheless access other blocks locally if they are not being used by their licence holder. In Germany, assignments were conducted for the 24.25 – 27.5 GHz band. These assignments are made at the local level, on an ongoing basis based on the principle of "use it or lose it"[14]. Meanwhile Finland has chosen a hybrid model, with national assignments of three blocks of 800 MHz in the 25.1 – 27.5 GHz band, and local assignments in the 24.25 – 25.1 GHz band.

Question 63. What geographical award procedures do you believe are relevant for the 26 GHz band? And why? What band widths should be awarded in each case?

4.2.3 The 3410 – 3490 MHz band (low range of the 3.5 GHz band)

The 3410 – 3490 MHz band is part of the 3.4 – 3.8 GHz band that has been harmonised in Europe[15] for mobile use. It will be available in the whole of Metropolitan France on 25 July 2026, and is currently used in Metropolitan France to operate public-initiative ultrafast wireless broadband networks and wireless local loop (WLL) networks, to provide a fixed internet access service.

Question 64. In light of the facts listed above, what award timetable seems the most relevant to you?

Several award procedure options are available.

The first option would be to assign this band for the whole of Metropolitan France, in keeping with the rest of the 3.4 – 3.8 GHz band in Metropolitan France. A rearrangement of this band could also be planned to ensure, if appropriate, the contiguousness of the newly assigned frequencies and those already held. This option would create the ability to increase the quantity of useable adjacent

[14] Frequencies are reassigned to a new licence holder that requests them, if the first licence holder no longer uses the frequencies it was initially assigned.

[15] Decision 2008/411 (amended) of 21 May 2008

frequencies, and thereby increase speeds on existing networks. Under the terms of this assignment, licence holders could be subject to new coverage and quality of service obligations.

A second option would be to assign this frequency band for local zones and confined to specific, circumscribed projects. These projects could, for instance, involve networks deployed over a given company's geographical footprint, or networks dedicated to deploying innovative services across a metropolitan area. This option would give a larger number of players direct access to the frequencies, and create the ability to adjust the quantity of frequencies assigned according to each player's needs, and thereby ensure efficient use of the spectrum.

Question 65. What guard band would be needed to ensure that 5G equipment is able to comply with the transmit power level defined by CEPT, while ensuring the coexistence with the Ministry of the Armed Forces' radars that use the frequencies below 3.4 GHz? At what point in the future do you believe it will be possible to use a narrower guard band?

Question 66. Regarding the first option, which application(s) would justify the need for more than 100 MHz in the 3.4 – 3.8 GHz band? Is current equipment compatible with the use of non-contiguous frequency blocks in this band? If this is not the case, when will this become possible? Will the band need to be rearranged? At what point in time, and or what reasons?

Question 67. Regarding the second option, what would be the minimum frequency granularity to be assigned per licence holder? What rules governing the coexistence between the different 3.4 – 3.8 GHz band licence holders would need to be established?

Question 68. Which option among those listed above do you think is the most advisable? For what reasons?

4.2.4 The 2.1 GHz FDD band (assigning guard bands)

Decision (EU) 2020/667 of 6 May 2020 harmonising the conditions for using frequencies in the 2.1 GHz band authorises the removal of the 300 kHz guard band at the upper and lower boundaries of the frequency arrangement. This newly available 600 kHz of spectrum is to be added to the already available 200 kHz resulting from the removal of a guard band at the national level. The plan is therefore to assign the 1920 – 1920.5 MHz and 1979.7 – 1980 MHz sub-bands with their respective 2110 – 2110.5 MHz and 2169.7 – 2170 MHz pairs. This assignment will be based on an FDD structure as set forth in the European Commission's revised harmonisation decision.

Question 69. Would you like to obtain frequencies in the 1920 – 1920.5 MHz and 1979.7 – 1980 MHz sub-bands? If so, what quantity? Which technology would you use with these frequencies? Would the band need to be rearranged? If so, for what reasons?

4.2.5 The 2.1 GHz TDD band

Starting on 12 December 2022, the entire 20 MHz of the 1900 – 1920 MHz, aka 2.1 GHz TDD band will be available for assignment. Today, 15 MHz are already available. Decision (EU) 2021/1730 of 28 September 2021 harmonises the 1900 – 1910 MHz sub-band for Railway Mobile Radio.

Question 70. Would you like to obtain spectrum in this frequency band? If so, what quantity? Which technology would you use with these frequencies?

4.2.6 The 3.8 – 4.2GHz band

In its Opinion of 16 June 2021, the RSPG recommends investigating possible use of the 3.8 – 4.2 GHz frequency band for local (low/medium-power) vertical applications, while protecting satellite earth stations and other existing fixed applications and services using this band.

Work has in fact already begun within CEPT on harmonising this band, under conditions enabling the coexistence between mobile services and fixed satellite services. They are expected to be completed by 2024-2025.

Arcep, meanwhile, recently opened a trial platform in the 3.8 – 4.0 GHz band for new 5G use cases, particularly for manufacturers and other vertical industry players. Applicants can request up to 100 MHz be made available to them, in the form of a local authorisation to use frequencies for trial purposes, for a period of three years.

Question 71. What, in your opinion, are the expected use cases for this frequency band? Do you plan on taking advantage of the trial platform?

Question 72. Do you see any advantages in using this band for 5G or another mobile technology? Within what timeline? With what quantity of spectrum and over what geographical area? To provide which services?

Question 73. What would be the right conditions for cohabitating with other services already using this band?

Question 74. Once the band is standardised, would you like to see it assigned in France? If so, in what way?

Question 75. Do you think it will be necessary to impose a synchronisation frame in this band? If not, what other coordination method would be advisable?

4.2.7 The 738 – 753 MHz (aka 700 MHz SDL) band

The 738 – 753 MHz, aka 700 MHz SDL frequency band is harmonised at the European level for mobile network Supplementary DownLink (SDL). This 15 MHz of spectrum is available across the national territory and could be assigned for the operation of a public mobile network.

Question 76. Do you see any appeal in using the 738 – 753 MHz band as an SDL channel for 5G or some other technology? Under what timeline? What bandwidth seems advisable for use of this band?

4.2.8 The 66 – 71 GHz band

The technical conditions for the 66 – 71 GHz band have already been harmonised for short-range applications and links between small cells in Europe by Decision 2006/771/EC amended, which provides for a technologically neutral general authorisation, aka “unlicensed band”, framework. This European harmonisation was transposed into French Law by Arcep Decision No. 2014-1263 (amended).

In accordance with this Decision, Arcep does not issue individual licences in this band. It is therefore already possible to deploy indoor or outdoor wideband data transmission systems in the 57 – 71 GHz band, provided one complies with the technically harmonised conditions.

Moreover, the 2019 World Radiocommunication Conference (WRC-19) identified the 66 – 71 GHz band for 5G and Arcep Decision No. 2014-1263 (amended) authorises use of this band for mobile services and for fixed point-to-point and point-to-multipoint links.

Question 77. What uses do you expect to make of this band, under this general authorisation framework? Does the introduction of 5G seem advisable? Under what timeline?

4.3 Frequencies identified by ITU in the process of being harmonised in Europe

4.3.1 The 42 GHz band

In the millimetre wave (mmWave) band ranges, the 2019 World Radiocommunication Conference (WRC-19) identified the 40.5 – 43.5 GHz (aka 42 GHz) band for 5G. The harmonised conditions for using this band are still being examined.

Preparatory work for WRC-19 revealed, in particular, the need to specify the conditions for coexistence with, on the one hand, satellite earth stations (operating downlink or uplink depending on the range) and, on the other, radio astronomy in the 42.5 – 43.5 GHz band.

Question 78. What, in your opinion, would be the possible mobile uses of this band? What are the likely satellite uses of the band?

Question 79. What is the forecast availability for hardware to provide mobile services in the band?

Question 80. What technical conditions for coexistence could be implemented for this band? What governing system could be put into place (e.g. general authorisation)?

4.3.2 The 450 – 470 MHz (aka 450 MHz) band

The 410 – 430 MHz and 450 – 470 MHz bands are the main frequency bands used today by low-speed and narrowband Private Mobile Radio (PMR) networks. There are more than 20,000 current PMR frequency authorisations in this band, issued to more than 5,000 licence holders.

These bands have been the subject of harmonisation and standardisation work, with a view to introducing all or part of the 410 – 430 MHz and 450 – 470 MHz bands of LTE networks. The planned channel widths are 1.4 MHz, 3 MHz and 5 MHz.

The main difficulty today lies in the fact that these frequency bands are very heavily used, and that existing networks often involve security needs, requiring high availability and uninterrupted service.

Question 81. Do you confirm the need to introduce LTE technology in the 450 MHz band? To satisfy what need? Over what geographical footprint?

Question 82. What is the minimum bandwidth (1.4 MHz, 3 MHz or 5 MHz) that would make the band useable for LTE technology? Under what timeline?

Question 83. To what extent could narrowband equipment currently using the 450 MHz band cohabitate with LTE equipment? With what guard band and what protective distance?

Question 84. In what way do you think it is possible to ensure existing equipment's transition to LTE technology? Do you believe it is indispensable to rearrange the 450 MHz band's current systems? If so, in what frequency band(s)?

Question 85. What is your view of the maturity of the LTE industrial ecosystem in the 450 MHz band?

Question 86. Are there other possible uses of LTE networks?

4.4 Possible future bands, being discussed around the globe

4.4.1 The 470 – 694 MHz band

The possibility of opening up of the 470 – 694 MHz band to mobile service is on the agenda for the 2023 World Radiocommunication Conference (WRC-23). An assessment of the uses and of broadcasting and mobile service needs in this frequency range is required to identity whether there is a need to introduce new mobile networks in this band.

In France, the law stipulates that the 470 – 694 MHz band is reserved for digital terrestrial television (DTT) broadcasting at least up to 2030.

Question 87. What are your mobile traffic growth forecasts, and for applications that would support the need for low frequencies? Within what timeframe? What quantity of spectrum would be needed?

Question 88. Why might current needs that could be met by this band not be met by other means (for instance, shutdown of 2G/3G technologies in the band 900 MHz with a view to handing the band over to 4G/5G technologies, mobilisation of the bands among those listed in part 4.2 of the consultation, carrier aggregation of the bands already being used)? Do these needs argue in favour of a national or local assignment zone?

Question 89. Could certain mobile technologies satisfy broadcasting needs? What is your opinion on the appeal of 5G broadcasting on this or other bands?

Question 90. Under what conditions do you believe that cohabitation between mobile services and DTT would be possible?

4.4.2 The 6425 – 7125 MHz (aka 6 GHz) band

The 6425 – 7125 MHz (aka 6 GHz) band is currently used for microwave transmission and for satellite uplinks (C band).

The WRC-23 will examine the possibility of using part of this band for mobile services in Region I, which includes Metropolitan France. Moreover, Wi-Fi systems' use of increasingly high-range frequencies, which now include frequencies in 5 GHz and 2.4 GHz bands, is generating newfound interest for these systems in the 6 GHz band. Wi-Fi systems have in fact already been authorised in this band in several countries (the Americas, South Korea, Saudi Arabia).

Question 91. What is your assessment of the development outlook for these uses (Wi-Fi, IMT[16])? Can you identify other uses that are likely to develop in this band?

Question 92. What rules for cohabitation with existing uses (microwave transmission, satellite services) in this band would be necessary?

[16] International Mobile Telecommunications, nomenclature used by ITU for terrestrial mobile services standards

Question 93. Do you think the band is a good candidate for implementing dynamic spectrum sharing to handle the planned uses for it?

4.4.3 Frequency bands above 90 GHz

Communications in THz-range band could be attractive for IMT, notably for 6G.

Question 94. Are mobile applications possible in these frequency bands? If so, which ones are being considered? With what commercial outlook, and under what timeline?

Question 95. If applicable, when do you expect mobile technology to be available for these bands?

Question 96. Do you see any reason to conduct mobile trials using these frequencies? Within what timeframe? Have you identified specific frequency bands for this purpose?

5 Other possible topics

Question 97. In addition to all of the topics addressed in the previous sections of this consultation, what issues surrounding the award of new frequencies for mobile networks warrant being brought to Arcep's attention?