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September 23, 2022

Réponse à la consultation publique « Préparer le futur des réseaux mobiles »
Direction mobile et innovation
Autorité de régulation des communications électroniques, des postes et de la distribution de la presse
14 rue Gerty Archimède
CS 90410
75613 PARIS CEDEX 12

Re: Preparing for the future of mobile networks

The Dynamic Spectrum Alliance (DSA)[1] respectfully submits these comments in response to the Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (ARCEP) Public Consultation on "Preparing for the future of mobile networks" (the Consultation), which seeks information regarding the future of mobile technologies, uses, and services, including frequency requirements, in addition to the connectivity needs of industry "verticals."

DSA commends ARCEP for its efforts to identify future demand for mobile services and explore how mobile networks may need to evolve to meet that demand, particularly in light of technology developments that can help spectrum to be managed more effectively. DSA shares ARCEP's goals of ensuring efficient assignment and use of scarce radio frequencies while making spectrum available for both existing and new wireless services in order to facilitate competition, enhance connectivity, and promote investment.

DSA encourages ARCEP and other telecommunications regulators to consider spectrum sharing approaches that allow multiple technologies, services, and deployment types to share and maximize efficient use of frequencies. In addition to considering lower power or localized use cases to enable sharing, we recommend that regulators leverage dynamic shared access systems to maximize operational flexibility for new services as well as maximizing spectrum efficiency. DSA believes that providing additional spectrum access options through use of new spectrum management tools, such as dynamic shared access systems, will help meet future mobile data traffic demands, benefit competition, create conditions for innovation, and spur more rapid deployments of wireless networks and services.

DSA also welcomes ARCEP's interest in finding solutions for industry "verticals," including new 5G private mobile networks, local use cases, and applications. We encourage ARCEP to provide a variety of spectrum access options, including licensed, unlicensed and lightly licensed, to enable enterprises either to contract with an existing mobile network operator, deploy and manage their own private networks, or contract with a third party to deploy and manage a network on their behalf. Having all three of these

[1] The DSA is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members

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options available to enterprises will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G networks and services.

DSA appreciates the opportunity to participate in the Consultation and to present our views and comments on these exciting topics. Our comments below will focus on specific questions in the Consultation related to spectrum usage, requirements, and management, particularly in the 6 GHz and 3.8-4.2 GHz bands. We are available to discuss these comments and provide any additional information as ARCEP considers options for implementing such systems in France.

Respectfully submitted,

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RESPONSE TO QUESTIONS

Question 2: What are the most relevant changes brought by (Wi-Fi 7)? When will these developments be available in the networks and terminals? If applicable, what new frequency needs will these developments create?

Wi-Fi 7 is the Wi-Fi Alliance label for the IEEE 802.11be amendment to the IEEE 802.11 standard. Earlier this year, Wi-Fi Alliance finalized Draft 2.0 of the Wi-Fi 7 specification. The most significant changes Wi-Fi 7 will enable include support for wider channels, multi-link operation, and 4K Quadrature Amplitude Modulation (QAM). The new, larger 320 MHz channels will increase data throughput. Through multi-link operation, Wi-Fi enabled devices will be able to send and receive data combined over three frequency bands (2.4 GHz, 5 GHz, or 6 GHz), with the mix of channels shifting at any time based on data traffic and other factors. Multi-link operations will result in reduced latency, greater reliability, and more rapid data transmission, while 4K QAM will allow each Wi-Fi 7 transmission to carry more data than the current generation of technology, speeding downloads significantly.

With three 320 MHz-wide channels, Wi-Fi 7 will support throughputs of 30 gigabits per second (Gbps), which is more than three times as fast as the 9.6 Gbps maximum of Wi-Fi 6. Making three 320 MHz-wide channels available for Wi-Fi 7 will necessitate access to the entire 1200 MHz of the 6 GHz band (5925-7125 MHz). 6 GHz is the only frequency band where there is sufficient spectrum for consumers and enterprises to take full advantage of Wi-Fi 7. Were only the lower half of the band (5945-6425 MHz) available for license-exempt use in France and the rest of Europe, then only a single 320 MHz-wide Wi-Fi 7 channel could be supported.

Wi-Fi equipment manufacturers have already started the process for building Wi-Fi 7 compatible products even while the standards development process is underway. For example, at the recent DSA Global Summit held in Paris, Broadcom demonstrated the capabilities of its Wi-Fi 7 chipset. While some early Wi-Fi 7 products may be available in late 2023, widespread availability is expected to begin in 2024 once the standard is finalized.

Question 5. In what way do these [mobile network] architectural changes call, if necessary, for a change in the management of access to frequency resources (identity of frequency authorization holders, allocated quantities, etc.)?

Today we have the technical ability to automate frequency coordination and thereby lower transaction costs, use spectrum more efficiently, speed time-to-market for new services, protect incumbents from interference with greater certainty, and generally expand the supply of wireless connectivity that is fast becoming, like electricity, a critical input for most other industries and economic activity.

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To maximize the efficient use of spectrum and provide a variety of access options, DSA recommends that regulators worldwide implement automated shared access systems as well as innovative licensing frameworks. In the whitepaper entitled "Automated Frequency Coordination - An established tool for modern spectrum management,"[2] DSA makes the case that the use of databases to coordinate spectrum assignments has evolved significantly since its first introduction, but at its heart, it is nothing new. The basic steps are the same as in a manual coordination process or where a regulator assesses the opportunities for local licensing on a case-by-case basis. However, what is new includes:

- Surging consumer demand for wireless connectivity and hence the need to intensively share underutilized frequency bands;
- Significant improvements in the computation power to efficiently and rapidly run advanced propagation analysis and coordinate devices and users in near real-time; and
- More agile wireless equipment that can interact directly with dynamic frequency coordination databases.

When considering licensing approaches for new bands for mobile services, DSA encourages regulators to consider a tiered licensing approach to provide multiple spectrum access options. A three-tier or two-tier framework could be adopted depending on the frequency band and its incumbent situation. In bands where incumbents are operating, those operations could continue in the top tier on a protected basis, while new entrants in one or more lower tiers may operate so long as they protect the top tier. A three-tiered approach could be adopted as follows:

Tier 1 – Incumbent users. Users operating in the band that have the highest priority in accessing spectrum. Their access must be guaranteed at all times during their operation so their radio equipment does not need to be aware of other operations sharing the band.

Tier 2 – Licensed new users. New entrant users that require a degree of certainty in accessing spectrum. In order to ensure that the band can be shared with this tier of new users, it is fundamental that the operation of incumbent services is well understood (for example, they operate only in certain areas) and is predictable (for example, they operate at certain times or there is a way to know when spectrum needs to be vacated). If such information is not accurate enough or it is not available, then access to the band for Tier 2 users might be greatly reduced or not possible at all.

Tier 3 – Opportunistic users. New entrant users that can access spectrum on an unlicensed or licensed by rule basis. These users may not need access to spectrum over a larger geographic area and/or are operating indoors or on a campus or may be operating in more remote areas where spectrum usage will not be as competitive. In many cases, such networks are deployed in very remote areas where spectrum is largely unused and the risk of interference to higher tier users is negligible. There might be other cases where there is sufficient spectrum available and the envisioned applications allow QoS flexibility, for

[2] Available at http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf

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example because the band would mainly be used to provide additional capacity to networks using other anchor frequencies. In such cases, it is conceivable to have a third tier of users with minimal regulatory barriers and no need for interference protection from other Tier 3 users.

In theory, a tiered spectrum sharing model can be applied to any band. In addition, it is also possible to combine a tiered licensing approach with streamlined secondary market rights. For example, the new license conditions might include the right for the license holder to lease the spectrum to other users – whether on a geographic basis (partitioning) or by sub-dividing the spectrum (disaggregating). Such a secondary market can drive innovation, allow new technology to be deployed by leased spectrum users, and support various sectors, such as enterprise networks and industrial uses.

Additionally, DSA recommends that regulators consider implementing a "use-it-or-share-it" policy for bands that are licensed to mobile network operators. Conceptually, use-it-or-share-it rules authorize opportunistic access to licensed spectrum that is locally unused or underutilized. Until the spectrum is actually put to use in a local area, it should be available for non-interfering use by networks and devices. Licensees lose no rights whatsoever. In 2016 the FCC authorized opportunistic access by General Authorized Access (GAA) users to unused Priority Access License (PAL) spectrum in the 3.5 GHz Citizens Broadband Radio Service (CBRS) band. Opportunistic use of unused PAL spectrum is controlled by the SAS, which requires that GAA users must periodically check with the database to renew permission to continue operating. This is one of the key reasons for the success of CBRS.

A general use-it-or-share-it authorization has a number of affirmative benefits. First, opportunistic access reduces spectrum warehousing in areas where the economics are least attractive for large service providers. It might increase access for operators that are interested in deploying, but who lack needed spectrum access in that local area. Second, opportunistic access further encourages secondary market transactions by facilitating price discovery on both the supply and demand side. For licensees, it will both identify users interested in a potential lease or partition and provide information on the potential value (i.e., how much is my spectrum worth?). For users, opportunistic use is an opportunity to test the local market and to determine the value of a more secure, longer-term lease or partition agreement (i.e., how much am I willing to pay for spectrum?). Third, opportunistic access will lower barriers to entry for innovative new use cases by parties that at least initially either cannot afford or do not believe they need to pay for exclusive use and interference protection. The option to deploy, at least initially, without committing to the cost of a long-term lease or license could be particularly useful for small providers and industries

Question 14. What could be the specific needs for making temporary resources available for specific occasions (worksites, one-off events)?

Please see the response to Question 15 below.

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Question 15. What are the specific needs of entities established in several countries? Do you identify specific needs for very small, small or medium-sized enterprises (VSEs and SMEs)? What could be the issues regarding the frequency resources they require?

One example of a successful implementation of an automated shared access system and novel licensing framework is the 3.5 GHz CBRS band in the United States. Authorized by the Federal Communications Commission (FCC) in January 2020, CBRS has been a shining example of the myriad benefits of automated spectrum sharing, including meeting the needs of various sized enterprises.

Under the CBRS regulatory framework, the spectrum access system (SAS) coordinates CBRS frequency use (3550-3700 MHz) and manages coexistence among the three tiers of access:

1) Incumbent (e.g., navy radar and commercial fixed satellite services);
2) Priority access licensed (PAL); and
3) General authorized access (GAA).

The environmental sensing capability (ESC) network detects incumbent naval radar use of the band and alerts the SAS to move new terrestrial commercial operations to non-interfering channels. The SAS also interfaces with the FCC's Universal Licensing System (ULS) to obtain information about fixed satellite service (FSS) incumbents and grandfathered fixed wireless systems. Using this information, the SAS is able to calculate aggregate interference from new commercial users to incumbents and enforce protection of these systems. In the 30 plus months of commercial operational experience, no incumbents have reported interference from new CBRS users, demonstrating the effectiveness of SAS management of the band.

Commercial users in the CBRS band have multiple options for accessing this 150 MHz of spectrum:

- Acquisition of a PAL in the FCC's 2020 CBRS auction where use-or-share rights for county-based licenses were offered;
- Use of the GAA tier, which does not require an individual license to operate, but does require use of certified equipment and connectivity to a SAS to receive a spectrum grant for operations with a particular transmit power and antenna orientation at a specific location and height; or
- Leased rights from a PAL license holder.

Based on the type of device (fixed or personal/ portable) and its coordinates, information about the transmitter's location and operating parameters and the technical rules adopted to protect incumbents and/or adjacent users from harmful interference, the SAS calculation engine determines the list of available channels at the PAL and/or GAA device location and its maximum permissible radiated power.

As described above, the SAS not only coordinates protection of incumbent users from new commercial operations, but also manages the assignment of frequencies to PAL and GAA users, protection of PAL operations, and co-existence among GAA users to maximize spectrum efficiency and provide deterministic access for all users. The automated SAS process provides

near real-time management of the CBRS band, speeding time-to-market while minimizing uncertainty and administrative burdens.

Through this automation of shared spectrum, a whole host of new services have emerged. In addition to densification of the nationwide public mobile networks, and use of these frequencies by rural wireless Internet service providers (WISPs), a wide variety of private networks are also using the CBRS band.

From business to leisure, hundreds of smart office, airport and stadium private networks have been deployed using CBRS. As the result of having access to spectrum without the need for an individual license, these enterprises of varying sizes are able to take advantage of the substantial 4G/5G ecosystem that has developed in the 3 GHz band. In fact, in less than three years after receiving authorization for commercial operations, 270,000 CBRS cell sites have been deployed across the United States with the vast majority using the GAA tier.

Examples of such private wireless network deployments using the CBRS GAA tier include:

Energy management:
https://www.fiercewireless.com/private-wireless/schneider-electric-adds-private-wireless-smart-factories

Retail:
https://www.druidsoftware.com/2019/11/15/cbrs-ongo-at-american-dream-entertainment-retail-complex-nj-usa/

Military logistics:
https://www.fiercewireless.com/private-wireless/federated-demo-dod-highlights-benefits-shared-spectrum

Municipal government:
https://www.fiercewireless.com/private-wireless/motorola-and-harris-county-build-private-lte-network

https://www.fiercewireless.com/private-wireless/cox-launches-cbrs-pilot-city-las-vegas

Transportation:
https://www.fiercewireless.com/wireless/boingo-deploys-trial-cbrs-network-at-dallas-love-field-airport

Education:
https://www.csrwire.com/press_releases/747561-private-wireless-helps-schools-close-digital-divide

https://www.fiercewireless.com/private-wireless/fort-worth-isd-builds-sustainable-cbrs-network

https://www.fiercewireless.com/private-wireless/samsung-amdocs-deploy-private-cbrs-network-howard-university

Entertainment:
https://inbuildingtech.com/venues/connectivity-wireless-jma-stadium-cbrs/

Hospitality:
https://www.thefastmode.com/technology-solutions/24585-airspan-networks-deploys-5g-cbrs-private-network-for-hospitality-industry

Manufacturing warehouse/supply chain:
https://www.fiercewireless.com/private-wireless/calchip-connect-emerges-key-player-private-wireless

https://www.fiercewireless.com/private-wireless/mxd-adds-second-private-wireless-network

Agriculture:
https://www.fiercewireless.com/private-wireless/three-day-deployment-makes-tractors-autonomous

https://enterpriseiotinsights.com/20220607/smart-farm/how-robot-tractors-and-a-private-network-came-together-at-a-smart-vineyard

In addition to the CBRS band, the 6 GHz band is expected to support the ongoing connectivity needs of enterprises. To support these growing enterprise demands, DSA strongly recommends that regulators adopt the following approach:

1) Allowing 1200 MHz (5925-7125 MHz) of the 6 GHz band for license-exempt use; and

2) Authorizing the three categories of license-exempt devices:

(i) Very Low Power (VLP) devices

(ii) Low Power Indoor (LPI) devices, and

(iii) Standard Power (SP) devices that can operate both outdoors and indoors under the coordination of an automated database management system, known as the Automated Frequency Coordinator (AFC).

AFC systems have been designed to interact with regulators' licensing databases to provide channel availability information to unlicensed devices, while ensuring that incumbent systems, including fixed point-to-point microwave links, are protected from interference. When an authorized and authenticated device queries an AFC for spectrum availability, the AFC assesses which incumbent receivers have the potential to receive excess energy from the unlicensed device

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based on its location and potential transmit power. The AFC calculates the maximum transmit power for that device's location on each 6 GHz channel and provides a list of options for the device to select. The device must check in with the AFC daily to determine if any changes to incumbent use of the band have occurred that would alter the channel and transmit power options available to it.

Building on the experience and lessons learned from the use of SAS in the CBRS band, several DSA members have developed AFC systems for the 6 GHz Band and have applied to become AFC system operators in the United States. It is expected that the FCC will certify a number of AFC system operators and permit standard power unlicensed devices to begin using the 6 GHz band in early 2023. DSA anticipates that many of these same AFC system developers will also seek to operate in countries, such as Canada, Brazil, Korea, and Saudi Arabia, that are in the process of finalizing their regulations for unlicensed access to the 6 GHz Band, including use of an AFC to manage standard power devices.

Question 16. For what uses and what needs does the use of each of the three types of networks listed above seem to be the most relevant? For what reasons ? What are the requirements and prerequisites so that the use of these types of network can meet these needs? What are the frequency bands that would best meet these needs? Who are the actors who could offer these solutions?

DSA recommends that regulators provide licensed, unlicensed, and lightly licensed options for enterprises to be able to access spectrum for self-deployment of 5G fixed and mobile networks, through an existing mobile network operator, as well as through a third-party managed service provider. Having all three of these options available to enterprises will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G networks and services.

Question 19. Do you share this analysis of intermediation trends and identify others? How do you see the development of the ecosystem around these different models? What are the advantages and disadvantages of the different models?

As mentioned above in response to Question 16, DSA recommends that regulators provide multiple access options to enterprises, including direct access to spectrum on an opportunistic or localized basis, access through a public network operator, and/or through a third-party managed service. Providing multiple access options will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G networks and services. Limiting enterprises to only one option would retard competition and ecosystem development.

Question 20. Which actors in the ecosystem are most justified in having authorizations use of frequencies? For what reasons ?

As mentioned above, DSA recommends that regulators provide multiple access options to enterprises to meet their connectivity needs. The ability to acquire a license on their own (especially on an opportunistic or local basis), procure services through a national public service provider, or contract with a third-party network manager, such as a hyper-scaler, will provide enterprises with competitive choices and drive further innovation.

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Question 24. What are the expected changes in uses inside buildings? To meet the needs, what would be the most appropriate technical solutions and business models (eg neutral operator)? What types of actors would be likely to deploy them? What would be the competitive, technical, regulatory or other issues related to these solutions and business models?

In addition to Wi-Fi, which will be discussed in response to Question 26 below, private 4G and 5G networks are taking advantage of having opportunistic access to spectrum in the CBRS band to provide neutral host services, offering Mobile Network Operators (MNOs) support in managing signal traffic for visitors to offices, retail establishments and other public venues. By not only supporting internal connectivity for both staff and customers, but also extending this service for the reinforcement of existing MNOs, CBRS has presented the opportunity to eliminate barriers and limitations, providing full, flexible coverage whenever it is needed – even when roaming.

Question 26. What role does Wi-Fi play in all solutions for providing services inside buildings? If so, for what uses is Wi-Fi not an appropriate technology, and for what reasons?

Over 90 percent of European data usage takes place indoors, and 92 percent of that indoor traffic is carried by Wi-Fi. Where broadband capacity is provided to the network termination point of a residential building through fibre, coax cable, or fixed wireless, Wi-Fi is by far the most energy and spectrally efficient technology to bring that capacity from outside the building to the multiple devices operating within the building. Wi-Fi operations within a residence is 'nomadic' – that is, devices operate over a limited area from a fixed access point(s) distributed within the structure.

It is the collective experience of DSA's members that consumers do not focus on the broadband speed to their residence, but rather on the speed to their device(s) operating within their residence, the quality of the user experience, and the affordability of the service. We note that France has made a significant national investment in deploying fibre to the residence. Fibre provides significant bandwidth. However, if there is a bottleneck between the network termination point at the edge of the residence and the user device(s), French residents will not be able to receive the full benefits the fibre investments made by its government. The availability of Wi-Fi access points and Wi-Fi enabled user devices operating across the entire 6 GHz MHz band will ensure that multiple Wi-Fi devices operating at broadband speeds can operate concurrently, without creating a bottleneck.

By far, Wi-Fi is the most appropriate technology for providing solutions inside enterprises with respect to meeting typical cost and performance requirements where the Wi-Fi usage is fixed or nomadic -- which is the majority of environments. In general, the enterprise operator (almost) always has control over the spectrum environment of its facility, be it an office area or the manufacturing floor. As such, it can manage a dense Wi-Fi network to ensure that network performance is optimized within its facility. There are some applications, though, where portable devices have to operate "on the go" over a relatively large coverage area and where the enterprise operators does not have complete control over the spectral environment. In these limited instances, local licensing of private 4G and private 5G networks present a viable option.

In general, a relatively low-power, license-exempt technology such as Wi-Fi allows for permissionless innovation and rapid experimentation in many different industry verticals and

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consumer devices. The limitations of Wi-Fi networks are high-bandwidth use cases in high-density deployments where there is an insufficient amount of spectrum available to be shared. France can ensure that Wi-Fi can thrive in high-bandwidth / high-density use cases by ensuring that the entire 5925-7125 MHz frequency range is made available for license-exempt use.

Question 29. Do you have any proposals (levers for action, means, strategies, etc.) to share in terms of spectrum management or frequency allocation to reduce the environmental impact of networks and more generally to promote digital sustainability?

What requirements or prerequisites would be necessary to make this lever operational, if applicable (availability of data, methodological consistency, ex-post control/audit, etc.)?

The most energy efficient approach to the provision of residential broadband networks is the combination of a fixed network technology (e.g., fibre) to the building's network termination point, combined with Wi-Fi access point transmitting from the network termination point indoors to the multiple broadband Wi-Fi enabled devices operating within. Unlike wide-area IMT networks deployed to maximize wide-area coverage, Wi-Fi access points are deployed locally only in response to user demand.

Question 34. Of all the frequency bands listed above and detailed below, which appear to be priorities for your needs?

Of the bands listed in the Consultation, DSA considers the 6425-7125 MHz and 3800-4200 MHz bands to be the highest priority.

6425-7125 MHz. As mentioned above, DSA strongly recommends that the entire 6 GHz band be made available for license-exempt use across France and Europe. Authorizing the entire 1200 MHz for license-exempt use will allow French residents and enterprises to benefit from all the Wi-Fi 6E devices commercially available today, and importantly, also allow them to benefit from Wi-Fi 7 products expected to be widely available in 2024. Without sufficient license-exempt spectrum, there will be less interest in making these products available for the French market for early adopters. Importantly, making the 6425-7125 MHz band available for license-exempt device to share with incumbent users will continue to allow fixed service, fixed satellite service, and other incumbents thrive in the band.

Even in the face of a lack of demonstrated demand for additional 5G (IMT) spectrum, were the 6425-7125 MHz band to be identified for IMT at WRC-23 and licensed domestically for mobile operations, ARCEP will have to relocate fixed service links and other incumbent operations to other frequency bands. The clearing and relocation process will take years to complete and will create economic disruption to the affected incumbents. The best guess today is that the 6425-7125 MHz band could be cleared and made available to French mobile networks operators through auction around 2030. Realistically, the spectrum would not be put into widespread use until almost 10 years from now.

Alternatively, if ARCEP supports license-exempt access across the entire 6 GHz band and is able to convince AFNR that this position will most benefit French consumers and enterprises, the economic and societal benefits to France can begin accruing as soon as ECC SE-45 completes it

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work in 2024 and the homologation procedures are put in place, as there are currently many commercially Wi-Fi 6E products available today in North America and Asia.

3800-4200 MHz. DSA strongly supports plans to use the 3800-4200 MHz band for medium/low power local area licensing for verticals (e.g., private 4G and 5G networks). Such local licenses could be for both indoor and outdoor areas. Although the appropriate EIRP limits for these devices must be determined nationally, ideally they will cluster around similar EIRP limits within and across regions to foster global harmonization. Further, the DSA believes the spectrum management of these local licensing areas can be achieved through the development and application of automated or partially automated cloud-based spectrum management systems. Much has been learned over the years from the development of TV White Spaces Databases, the SAS for the CBRS band, and the AFC system, that can be applied to local licensing in France.

Question 36. Of the frequency bands questioned below, which seem most appropriate for localized allocation? To reuse by secondary use?

DSA supports the use of the 3800-4200 MHz band for locally licensed low and medium power networks and encourages the use of an automated spectrum management system to protect incumbent services, maximize efficiency, and offer multiple access options to new users.

Question 37. If applicable, if these frequency bands see the coexistence of mobile use and other uses (satellite, fixed link, etc.), what sharing methods do you consider relevant?

According to the ITU Spectrum Management Handbook, spectrum sharing can be based on time separation, frequency separation, spatial location separation, signal separation, and combinations of the above. Regardless of the coexistence mechanism, DSA believes that an automated or semi-automated spectrum management system can be implement that, in addition to administering the local licenses, can embody the technical conditions to enable spectrum sharing for local license networks operating in the 3800-4200 MHz band.

Question 38. For which frequency bands would "dynamic" sharing of the spectrum between license holders for mobile use, or between license holders for different uses, seem relevant? With what possible implementation methods?

DSA recommends that dynamic sharing be facilitated through an automated or semi-automated spectrum management system. Based on ARCEP's definition of dynamic sharing, the DSA believes that the broadcast TV bands (470-694 MHz) would meet the definition for dynamic sharing, albeit not with license holders for mobile use (at least at the present time). Under technical rules to protect incumbents, license-exempt fixed wireless access TV White Space Devices could access the broadcast TV spectrum in areas where one or more TV channels have not been assigned. To date, the TV White Space database has been able to successfully meet the challenge in several countries where TV White Space usage has been authorized.

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Question 72. In your opinion, what are the expected use cases with this frequency band (3.8-4.2 GHz)?

DSA recommends that ARCEP examine the use cases developed in the United States for the 3.5 GHz CBRS band (see the response to Question 15 above). Several DSA members offer commercial private 4G/5G solutions in the CBRS band and would be interested in working with French partners on commercial deployment of private networks in the 3.8-4.2 GHz band.

Question 73. Do you see any interest in using this band (3.8-4.2 GHz) for 5G or another technology mobile? What horizon? With what quantity and what geographic scope? To provide what services?

DSA believes that in the C-band, public 5G networks support consumers outdoors through enhanced broadband and that private 5G networks can complement Wi-Fi indoors and outdoors within enterprises. Between public 5G networks offloading most of its data over Wi-Fi and private 5G networks using the 3800-4200 MHz, the pressure for mobile network operators to seek additional mid-band 5G spectrum from regulators should be significantly lessened. That being said, DSA notes that in the U.S. CBRS band, mobile network operators are using PAL licenses in combination with other licensed spectrum to densify their mobile networks. The CBRS licensing framework with both licensed and general authorized access tiers is sufficiently flexible to permit both to co-exist and maximize spectrum efficiency.

Question 92. How do you assess the development prospects for these uses (Wi-Fi IMT)? Do you identify other uses destined to develop in this band?

The prospects of deployment of Wi-Fi 6E and Wi-Fi 7 low-power indoor access points, client devices, and related equipment (e.g., Wi-Fi 6E enabled television receivers) in France across the 6425-7125 MHz frequency range are very bright. There is commercial equipment available today certified for North American, South American, and Asian markets that operates across the entire 6 GHz band. The number of Wi-Fi 6E deployments in important verticals such as education and healthcare that take advantage of the entire 1200 MHz are increasing. New high bandwidth / high density use cases that require the full 1200 MHz of spectrum are being developed outside of France today.

The prospects of IMT operations in the 6425-7125 MHz range are speculative at best, however. By the time the band is prepared for mobile use (in ~10 years), 5G will be the previous generation of mobile technology. The prospects of the fixed service, fixed satellite service, and other incumbents currently operating in the 6425-7125 MHz band are diminished with the uncertainty created by the prospects that they may have to be relocated to another frequency band at some point if the band is licensed to mobile network operators.

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Question 93. What methods of cohabitation with existing uses (hertzian beams, satellite services) in this band would be necessary?

In ITU Region 1, FSS has a primary spectrum allocation in the 5925-7075 MHz band for Earth-to-space communications and a primary spectrum allocation in the 6700-7075 MHz band for space-to-Earth communications. Additionally, the Fixed Service has a primary spectrum allocation from 5925 MHz to above 7145 MHz. License-exempt low power indoor and very low power Wi-Fi devices operating in the 5925-6425 MHz band must protect Fixed Service and FSS incumbents from receiving harmful interference. Were Europe to adopt the same technical rules for low power indoor and very low power outdoor Wi-Fi devices in 6425-7125 MHz as those in the 5925-6425 MHz band, these same incumbent services will be protected from receiving harmful interference.

To date, there have been multiple opposing sharing studies submitted to the ITU-R Working Party 5D on the potential for IMT to coexist with FSS uplinks (Earth-to-space). Different assumptions and different models lead to different conclusions. Recall that in 2015, the ITU concluded that an indoor IMT small cell could not coexist with outdoor FSS uplinks operating in the 5925-6525 MHz band. The same FSS incumbents operate in the upper portion of the 6 GHz band as the lower portion of the 6 GHz band. Effectively, if WRC-23 identifies the 6425-7125 MHz band for IMT, it will send a strong signal to French regulators that the band should be cleared of incumbents. As it will take several years to clear the band, it will not be ready for IMT auction until 2030 or so, not in time for 5G, but for the yet to be defined 6G.

Question 94. Do you think that the band is suitable for setting up dynamic spectrum sharing in order to reconcile the uses envisaged?

Were only low-power indoor and very low power indoor / outdoor Wi-Fi devices given access to the 6425-7125 MHz band, it would not be necessary to establish a dynamic spectrum sharing regime. This approach would limit the band's utility, however, and would deprive consumers and enterprises alike the benefits of standard power and outdoor capabilities.

If ARCEP chooses to license the 6425-7125 MHz band for 5G or future 6G services, a dynamic spectrum sharing regime could be implemented to permit co-existence with incumbent services. However, the mobile network operators would likely exert pressure to relocate the incumbent fixed links in the band as well as the remote sensing satellite for the Copernicus mission.