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RADIO SPECTRUM POLICY GROUP

RSPG Opinion

on

Spectrum Sharing – Pioneer initiatives and bands

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Introduction

One of the key roles of the Radio Spectrum Policy Group is to assist and advise the Commission on strategic radio spectrum policy issues in the Union and on the coordination of radio spectrum policy approaches, as foreseen in the Commission Decision 2019/C196/08. The RSPG would fulfill this role in particular by issuing opinions on spectrum matters of interest in the EU and on the implementation of the regulatory framework for electronic communications in the field of radio spectrum, as well as on the coordination and cooperation between the Commission, Member States and relevant competent authorities and, upon their request by the Council and the European Parliament, in support of the strategic planning and coordination of radio spectrum policy approaches in the Union.

The Group shall also assist Member States in cooperating with each other and with the Commission, by coordinating Member States' approaches to the assignment and authorisation of radio spectrum use and publishing reports and opinions on radio spectrum related matters.

The RSPG develops its Opinions and other deliverables as foreseen in its annual Work Programme, or on request of the above EU Institutions.

In its Programme¹ of activity for the years 2020 and beyond the RSPG decided to dedicate a specific work item to spectrum sharing. The RSPG highlighted that spectrum sharing in the Union is so far implemented in a rather static and conservative manner and needs to be developed, in particular for its potential to achieve more efficient use of radio spectrum, and to give incentives for innovation. Furthermore, the promotion of the shared use of radio spectrum is a key objective included in the Directive 2018/1972 establishing the European Electronic Communications Code (hereafter referred to as "EECC"). Therefore, according to the RSPG Work Programme the means to improve spectrum sharing and to implement innovative sharing solutions should be investigated, especially by promoting trials (sandboxes), pioneer scenarios/bands, new forms of licensing and a strategic focus on take-up of methods using databases and Licensed Shared Access. In addition, the Programme envisages that the development and market opportunities for methods, including Artificial Intelligence, should be studied with a view to making concrete proposals for coordinated actions at EU level that bring added value to the Member States.

In accordance with the Work Programme, in this Opinion the RSPG investigated the options to promote spectrum sharing (part 1), identified key pioneer initiatives and bands (part 2) and developed a roadmap for increased spectrum sharing with actions to favour the introduction of innovative and more dynamic spectrum sharing solutions and proposals for coordinated actions (part 3). This Opinion is complemented by the Report RSPG21-016 "*Spectrum Sharing – A forward-looking Survey*".

This Opinion takes account of the results of a public consultation whose details are reported in the Annex.

1. Options for promoting Spectrum Sharing

1. Building on previous relevant deliverables from RSPG and taking into account different spectrum sharing technologies and approaches, as well as Member States initiatives, the RSPG investigated ways to increase spectrum sharing including more dynamic/opportunistic spectrum sharing options. They

¹ See https://rspg-spectrum.eu/wp-content/uploads/2020/02/RSPG20-005final-work_programme_2020_and_beyond.pdf.

are described in the Report RSPG21-016. Spectrum sharing can be developed in bands both with licensed and with unlicensed users, and combination thereof, and both in intra-service mode (i.e. between “peer” users providing the same service) and in inter-service mode (i.e. between incumbents and new users providing different services). The Report RSPG21-016 describes the possible cases. The following recommendations and considerations apply generally or only in specific cases among those indicated above, depending on the context.

2. Some examples of possible approaches are represented by the Italian “*club use*” at 26 GHz, which follows the principle of “*use-it-or-share-it*”, the spectrum pooling in the IMT-Bands, the Licensed Shared Access or the geolocation functionalities/geolocation database solutions². The current models could develop and improve, and furthermore new sharing models will occur in the future. It is recommended that Member States keep track of future developments.

3. Taking into account that not every spectrum sharing approach may be suited for every band, the RSPG is of the view that when designing a sharing framework, due considerations should be given to the propagation characteristics of the frequencies, the current and planned technological developments and the essential requirements of the services involved in the sharing approach.

4. The RSPG invites Member States to consider network slicing and roaming agreements, as well as other forms of access to spectrum resources, as complementary elements to promote spectrum sharing.

5. The RSPG seeks to nudge a change of mindset: all considerations in the field of spectrum made by policy makers, spectrum managers, users and industry should be done by pursuing better spectrum efficiency through more spectrum sharing, including by following the principle of “*use-it-or-share-it*”. Various means could be exploited as appropriate for the objective of promoting sharing: fostering voluntary agreements, incentivising commitments, imposing obligations.

1.1 Sharing conditions

6. When assigning new rights of use, Member States should consider sharing spectrum between incumbents and new users using innovative and more dynamic solutions.

7. The technical conditions for a sharing solution can be defined on a case-by-case basis, leveraging on the investigated technical possibilities and approaches. The sharing conditions should consider the requirements of the services involved including in terms of availability, reliability, security.

8. Where one or more incumbent users for services other than Electronic Communication Service occupy a band, Member States should assess whether sharing conditions can be applied in a multi-tier sharing approach.

9. Member States could consider sharing solutions, and other alternative/complementary approaches such as leasing, that may help vertical industries and other spectrum users to access spectrum on mutually beneficial basis, in particular to address local access needs.

10. Member States may need to assess any competition issues arising from the measures introduced.

² See Annex 5 of the RSPG Report RSPG21-016.

11. Whenever appropriate and useful, sharing conditions in licensed bands may be adopted for achieving the goal of a more efficient use of spectrum, in particular to fulfill coverage objectives, as well as to promote a faster network roll-out, increase the coverage, improve the capacity and the quality of service. The licensed operators must be informed in advance about the technical conditions and parameters of such a spectrum sharing approach.

12. Member States should favor spectrum sharing agreements, including those based on spectrum pooling among licensed operators, if necessary attaching conditions to those agreements, when they pursue public interest objectives such as more efficient use of spectrum, including enhanced coverage and/or capacity and network densification.

1.2 Strengthening trust and confidence

13. Spectrum sharing should not be considered the answer to any shortage of frequencies when addressing conflicting demands by various spectrum users or sectoral needs. Furthermore, some sharing solutions and approaches may work well in some circumstances and not in others. When defining and introducing sharing obligations and conditions Member States and the Commission could consider the implementing scenario and its foreseen development and in particular the opportunity to preserve confidence for all users.

14. In the work of standard and regulatory organisations such as ETSI and CEPT, Member States should promote studies on sharing approaches, compatibility and technologies that would lead to increased possibilities of sharing or co-existence solutions. While recognizing the need to protect incumbents and adjacent users, any technical assessment for developing sharing solutions should consider long term developments requirements for all users (incumbents, adjacent users, new entrants). Member States should also encourage CEPT and ETSI to develop harmonized standards and regulatory deliverables which support administrations in implementing specific sharing/co-existence solutions, where appropriate.

15. Member States and the Commission should encourage the development by industry and standardization organizations of high-performance transmitter and receiver specifications and the inclusion of appropriate essential requirements and test specifications for all equipment in harmonised standards and product standards in general and more specifically, when relevant to guarantee the effectiveness of spectrum regulatory decisions. Such essential requirements should provide sufficient guarantee that equipment cannot be modified by the user in a way which would negatively affect the sharing/co-existence solutions.

16. Member States should encourage industry to design receivers able to tolerate a given degree of unforeseen interference, in line with the need to avoid building sharing solutions based on worst-case scenarios.

17. In order to build confidence among spectrum users, Members States should strengthen market surveillance so as to ensure that equipment is well compliant with essential requirements. This is particularly important when sharing solutions are based on device features (such as those based on “*dynamic frequency selection*” or on authorisation from a database).

2. Identification of key pioneer initiatives and bands

18. The RSPG recognises that already today a large amount of radio spectrum is used on a shared basis. Free resources are hardly available, neither in time, nor in geography. Innovative sharing solutions and initiatives are mainly based on improving the authorisation process and on defining and implementing advanced technical sharing conditions. They aim either to (partly) automate it (e.g. via Artificial Intelligence or usage of information in a geolocation database) or to authorise "secondary"/additional spectrum usage (e.g. multi-tier-approach if and as long as a "primary" usage does not take place) and combinations thereof. This makes it difficult to identify specific pioneer initiatives or bands from a frequency management point of view within the scope of this Opinion.

19. The RSPG considers that all spectrum bands are potential candidates for introducing and enhancing spectrum sharing solutions along the policy lines highlighted above.

20. The RSPG recommends fostering all possibilities of spectrum sharing, when making available frequency bands which are identified for harmonisation in EU, and, in particular, with regard to those bands currently under consideration according to the EC Mandates to CEPT to develop harmonised technical conditions for introducing 5G in priority frequency bands above 24 GHz³ and to amend Commission Decision 2005/513/EC on the harmonised use of the 5 GHz frequency band following WRC-19⁴.

21. Member States should foster the introduction of innovative technologies in support of a multi-tier spectrum sharing approach⁵, in line with national circumstances.

3. Roadmap for increased Spectrum Sharing

22. Based on the previous recommendations and considerations, the following Roadmap is proposed for the objective of increased Spectrum Sharing.

3.1 Investigation of more dynamic spectrum sharing options

23. In order to facilitate the introduction of new spectrum sharing options in a context of scarcity of frequencies, the way the sharing conditions are defined should be based on realistic scenarios, rather than worst-case, and take into account as far as possible results of measurements to better understand the impact of real case interference.

24. Member States shall promote the efficient use of spectrum by facilitating the implementation of spectral efficient systems by spectrum users and incentivising the update of their current technologies to new more spectrally efficient ones. The use of spectrum efficient technologies is particularly important when radio technology is embedded in equipment with long lifetime.

25. Member States are encouraged to support the development of initial "*proof of concept*" systems in bands where advanced spectrum sharing systems, such as cognitive radio systems and other ICT or database assisted systems have been developed at least at the experimental level and are under the

³ See https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66338.

⁴ See https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=66340.

⁵ For instance, in order to guarantee a predefined QoS level for the spectrum users, Member States may allow access to those frequency resources in turn on a '*first come-first served*' basis and, once a certain threshold of users has been exceeded, any additional devices/users may access the frequency resource as secondary users.

control of the regulator, and to devise how those systems can be reused and considered for sharing solutions in other frequency bands.

26. Where it seems sensible and possible and there is demand, Member States are encouraged to issue temporary “*test&trial*”/“*innovation&trial*” licences (sandboxes), including in a multi-country context, where appropriate in order to foster innovation. Those licenses should give users, including non-traditional operators, the possibility to get access to spectrum. Member States may consider promoting the development, where appropriate, of monitoring tools for those trials and providing for the publication of relevant results.

27. The European Commission and Member States are encouraged to foster and authorise trials and experimental systems in the field of spectrum sharing whose framework makes use of Artificial Intelligence technologies, in order both to pave the way to the use of those technologies in commercial sharing frameworks and to build trust amongst users.

28. In order to introduce ICT-assisted or database-assisted spectrum sharing solutions, Members States might foster work by CEPT and ETSI to support the implementation of such spectrum sharing approaches. This would require the development of standard communication interfaces between the devices and the database as well as a framework for the establishment and management of databases.

29. Such work should remain sufficiently generic to adapt to sharing conditions in various frequency bands as well as to allow addressing local specificities.

30. Where applicable and possible, and in line with EU single market objectives, when applying spectrum sharing solutions based on a geolocation database, Member States should leverage on the aforementioned standard communication interfaces and database management framework, and support the development of the DB-based spectrum sharing solutions, including those employing equipment capable of operating in a multi-country context taking into account interoperability requirements, while safeguarding public services interests such as those regarding public safety and national security.

31. To facilitate sharing scenarios, Member States may consider the on-line availability of information about radio spectrum usage. When doing so, Member States should adapt the information, before making it available, in an appropriate anonymized format of spectrum usage, e.g. protection or exclusion zones, protection criteria, time of usage, in line with national circumstances (cybersecurity, confidentiality, other legal requirements, etc.).

32. Given examples developed or adopted by spectrum regulators to provide authorisations in a dedicated spectrum band under a light licensing regime based on an automated platform, Member States may consider applying similar approaches to their respective authorisation processes to foster more dynamic spectrum sharing.

3.2 Coordinated actions

33. With the aim of facilitating spectrum sharing the RSPG invites Member States to share their experiences with innovative spectrum sharing solutions and initiatives. In particular, RSPG invites Member States:

- 34. to share experiences related to new sharing cases and more dynamic approaches to spectrum management authorised in their countries, including solutions to appropriately and proportionately address any interference concerns and coexistence issues;
- 35. to share best practices in cases having a multi-country and/or a cross-border dimension with EU footprint, taking into account the results of EU funded projects and pilots as well as trials targeting verticals;
- 36. to collaborate in multi-country, cross-border and public-private research and development projects, e.g. by using funding programmes of the Union, and share the results of those projects.

37. The RSPG recommends the European Commission to continue funding and give priority to EU research projects aimed at increasing the commercial development of technologies and network architectures that can make spectrum sharing more efficient and ease its development.

38. The RSPG recommends Member States to take into account developments towards innovative spectrum sharing solutions and initiatives outside the Union.

39. In order to foster a more dynamic/opportunistic spectrum sharing and a more automated access to spectrum for the mid-term, the European Commission and the Member States, on the basis of the appropriate deliverables from CEPT and ETSI, should identify use cases scenarios that require spectrum sharing and allow the development of a *proof-of-concept* sharing framework using ICT based systems with innovative technologies, such as Artificial Intelligence/Machine Learning and collaborative techniques. Member States should leverage on the above spectrum sharing solution to contribute to build trust amongst users and industry, together with enhanced market surveillance and spectrum monitoring, so to speed up the commercial application of the identified solution.

Public Consultation Results

A public consultation on the draft version of this Opinion was held from 15 February 2021 until 26 March 2021. In total 27 responses were received. All non-confidential responses (26) are published on the RSPG website <https://rspg-spectrum.eu/public-consultations/>.

The RSPG appreciated all comments received and thanks the participants.

Other than one respondent that asked to remain confidential, the following respondents provided comments:

APWPT	EUTC	Telefonica
BNE	Facebook	Tele Industrien
BTG	Federated Wireless	ULWIMO
COMMSCOPE	GSA	United Internet
DIGITALEUROPE	GSMA	University of Oulu
DSA	MVNO Europe	VCI
ECTA	NOKIA	VDMA
ESOA	PMSE	ZVEI
ETNO	Sigma Wireless	

The RSPG carefully considered all answers provided in the public consultation and improved the draft Opinion as appropriate. The RSPG highlights that the present Opinion is aimed at devising policy recommendations to the European Commission and Member States. All suggestions from the public consultation related to actual regulatory measures for spectrum sharing or working approaches of EU bodies and Member States' competent authorities are outside the scope of this Opinion and will be pointed out for consideration in the activity of those spectrum regulators.