

Huawei response to the Radio Spectrum Policy Group public consultation: Draft RSPG third opinion on 5G networks

Summary

Huawei welcomes the opportunity to provide feedback on this very important consultation.

We broadly agree with the opinions expressed by the RSPG in relation to the defragmentation of the 3.4-3.8 GHz band. In this context, we emphasise the importance of contiguous blocks of around 100 MHz per MNO in this band in order to deliver high performance 5G networks which compare favourably with those deployed in other regions. We encourage Member States to take proactive measures to avoid frequency and geographic fragmentation in this band, including well-designed auctions to avoid artificial spectrum scarcity, provision of guidelines on UL/DL synchronisation of networks to avoid inter-MNO guard bands and costly equipment, regulatory intervention to ensure successful market-led trading among MNOs where necessary, and phasing out of any legacy ECS use which is not compatible with 5G harmonised technical conditions.

On the opinions expressed by the RSPG in relation to provision of 5G connectivity for vertical use cases, we agree that MNOs, third parties, and the verticals themselves may all have a role to play. We emphasise the importance of MNO investment in kick-starting 5G network deployments and the device ecosystem in Europe. We highlight that MNO investment is not only motivated by enhanced MBB delivered via national public 5G networks, but also by the prospects of the MNOs serving vertical use cases by deploying a combination of *public* and *private* 5G networks.

We consider that the ability of verticals to lease ECS spectrum from the MNOs could eliminate the need for spectrum that is dedicated to vertical use cases which could result in undue spectrum fragmentation caused by service-specific assignments. Where Member States intend to consider authorising access to spectrum that is dedicated for verticals use cases (e.g., via forms of local licensing), we recommend that they target frequencies outside Europe's pioneer 5G bands, but which can still benefit from the economies of scale in equipment due to 5G deployments in the said frequencies in other regions. Finally, we consider that authorisations in such bands should not exclude any group of market players – including the MNOs – from deploying private 5G networks to serve vertical use cases.

On the opinion expressed by the RSPG on targeted EU public policy objectives requiring pan European services for specific verticals, we highlight the special case of Cellular V2X communications for cooperative intelligent transportation systems (ITS). We highlight the existing LTE-V2X technology which is designed to support basic safety services via V2V/I/P communications at 5.9 GHz. We note that (5G) NR-V2X is being standardised at 3GPP to complement LTE-V2X in enabling connected and automated mobility. We note that V2V/I/P communications require *common* spectrum to allow communications among all users, which today in Europe, includes the licence exempt bands harmonised for ITS at 5875-5905 MHz and at 63-64 GHz. Industry is assessing the need for additional spectrum in support of connected and automated mobility via NR-V2V/I/P, particularly at frequencies below 10 GHz. This is an area which may demand special attention from Member States and the RSPG in the near future.

Huawei's comments in relation to the draft RSPG third opinion on 5G

I. Concerning the defragmentation of the 3.4-3.8 GHz frequency band:

1. The RSPG recommends that Member States (MS) design spectrum award mechanisms that provide the opportunity to obtain sufficiently large contiguous spectrum blocks to facilitate high throughput multi-Gb/s 5G services such as enhanced mobile broadband. The RSPG notes that national awards processes may result in various spectrum blocks sizes due to market players strategies and that trading/leasing of rights of use ("spectrum trading") could also be considered as part of the national defragmentation tools/policy.

2. The RSPG notes that, taking into account different national legacy situations and competitive landscape, Member States may need different approaches at national level in order to achieve the above defragmentation objectives. In this regard, the RSPG recommends that Member States consider the guidance on defragmenting the band that has been developed by the CEPT (ECC Report 287).

Huawei considers that large contiguous blocks – of around 100 MHz – are necessary to achieve the targets of 5G at 3.4-3.8 GHz and to take full advantage of the 5G NR technology developed by 3GPP (see ECC Report 287 for an assessment of the benefits of such block sizes).

However, we see that the picture emerging across Europe is one where small and mid-sized blocks (of around 50 MHz) are becoming common. We also see that many MNOs hold non-contiguous blocks within the 3.4-3.8 GHz band. We consider that this is not optimal and that there is scope for Member States to take a more proactive approach to ensure large contiguous blocks per MNO.

Therefore we fully support RSPG's recommendation with regards to the importance of effective national defragmentation policies.

We encourage Member States to pursue policies which avoid any form of artificial spectrum scarcity. Apart from contributing to fragmented assignments, such scarcity unduly increases the auction fees, which could be otherwise used to invest in more extensive roll-outs of high-performance 5G networks.

We therefore recommend that Member States auction the spectrum at 3.4-3.6 GHz and 3.6-3.8 GHz at the same time and to the greatest extent possible. We also recommend that Member States adopt sufficiently small lot sizes (e.g., 10 MHz) in order to allow the market to decide on the size of the awarded blocks during the competitive auction process itself, rather than based on a regulatory decision which risks inefficient outcomes (highly different awarded block sizes) and artificially raised prices.

The principle of avoiding artificial scarcity should also be considered in other potential future spectrum awards for 5G. An example includes the 2.3 GHz band, where in some markets as much as 80 to 100 MHz can be awarded.

We would also like to point out the importance of UL/DL synchronisation among TDD mobile networks in the unpaired 3.4-3.8 GHz band. Such synchronisation is essential in avoiding the need for guard bands and expensive Tx/Rx filtering for both network equipment and user

devices in order to avoid inter-MNO harmful interference. For this reason, we recommend that Member States draw up guidelines to encourage cooperation among MNOs in pursuing spectrum efficient network synchronisation.

Another area to be considered is the efficiency of secondary markets. We agree that trading/leasing of spectrum usage rights can help in defragmenting a band (see also our response to Section II in the context of defragmentation and avoiding the need for spectrum that might be dedicated to vertical use cases). However, it may be that certain licence holders would not agree to trade with other licensees even if the outcome would be mutually beneficial in terms of the value/utility of the blocks. This could be for strategic reasons (for instance, if the holder wishes to prevent others from deploying 5G).

We consider that Member States should consider ways to mitigate these situations. One way might be to give notice to licence holders that the administration would take regulatory action and intervene to defragment the band if market-led trading has not led to efficient assignments (large blocks).

3. The RSPG recommends that, in order to facilitate 5G use in this primary band and subject to national situation, Member States phase out, as soon as possible, legacy ECS use in the band, which is not compatible with the 5G harmonised technical conditions.

Huawei agrees. Such measures would be very beneficial, especially because – apart from resulting in reduced availability of spectrum for individual national licensing of 5G networks – legacy ECS use that is not compatible with 5G harmonised technical conditions can place undue restrictions on 5G deployments due to the risk of harmful interference (for example due to lack of UL/DL synchronisation).

We note that Member States should strive to address defragmentation of 3.4-3.8 GHz both in the dimensions of frequency and geography in order to facilitate the national roll out of high performance 5G networks.

II. In order to ensure connectivity for vertical industries:

4. The RSPG notes that 5G will play a significant role in providing a communications service that meets the specific requirements for verticals alongside others technologies.

Huawei agrees. We consider that intelligent transportation systems (safety related services and automated mobility) and industrial automation are two of the most promising areas where 5G will play a significant role.

5. The RSPG notes that connectivity for vertical industries could be provided by mobile operator's solutions, third-party providers and directly by verticals themselves in EU harmonised ECS bands or in dedicated spectrum for verticals.

6. The RSPG recommends that Member States consider other spectrum solutions including dedicated or shared spectrum for the business/sectoral needs ("verticals needs") that may not be met by mobile operators. Such solutions could take advantage from economies of scale and ecosystem availability in spectrum bands with EU harmonised technical conditions.

Huawei agrees that MNOs, third parties, and the verticals themselves may all play a role in providing 5G connectivity for serving vertical use cases. However, we also note that ideas surrounding business models and value chains relating to the use of 5G for vertical use cases are still evolving. For this reason, the relative dominance of the abovementioned market players in delivering 5G connectivity for various vertical use cases remains uncertain.

What is certain is that the importance of investment by the MNOs in kick-starting the 5G network deployments and device ecosystem in Europe cannot be overstated. MNO investment in 5G is not just motivated by the prospects of enhanced MBB delivered via national public 5G networks. It is also motivated by the digital transformation opportunity for the verticals, and the prospects of the MNOs serving vertical use cases by deploying a combination of *public* and *private* 5G networks.

Central to the success of the MNOs in the above endeavour, is the availability of large contiguous blocks of around 100 MHz in ECS bands below 6 GHz and of 800-1000 MHz (starting with not less than 500 MHz blocks) in ECS bands at mmWave frequencies. These are required to allow the MNOs to fully exploit the performance capabilities of 5G, and deploy 5G networks which can compare favourably with those deployed elsewhere in the world.

For this reason, it is imperative that any spectrum which might be dedicated to vertical use cases is not at the expense of reduced availability of sufficiently wide contiguous bandwidths to the MNOs in pioneer 5G bands. Such a reduction would inevitably result in higher auction fees, as well as higher cost and/or lower performance 5G networks.

We consider that the possibility of verticals to lease ECS spectrum from the MNOs – potentially combined with suitable regulatory incentives – could altogether eliminate the need for spectrum that is dedicated to vertical use cases and avoid any unnecessary fragmentation due to service-specific assignments. To this end, we recommend that, as a first step, Member States remove any regulatory barriers towards market-led leasing of ECS spectrum by the MNOs to parties who wish to serve vertical use cases via private 5G networks.

Where EU Member States intend to consider authorising access to spectrum exclusively for serving verticals use cases (for example via forms of local licensing), we recommend that they target frequencies outside Europe's pioneer 5G bands, but which can still benefit from the economies of scale in 5G equipment due to 5G deployments in the said frequencies in other regions. Furthermore, in order to allow efficient business models to emerge, authorisations in such bands should not prohibit any of the market players mentioned above (MNOs, third parties, or verticals themselves) from deploying private 5G networks to serve vertical use cases.

7. The RSPG notes that, in addition to the above, in order to respond to some targeted EU public policy objectives requiring, for example pan European services for specific verticals, there may be need for technology neutral dedicated EU harmonised spectrum. RSPG recommends assessing these needs on a case by case basis and is ready to give its view when/where appropriate.

In the context of pan European services for specific verticals, Huawei would like to highlight the special case of Cellular V2X (C-V2X) communications for cooperative intelligent transportation systems (C-ITS).

The current realisation of C-V2X is LTE-V2X Rel-15, which was specified by 3GPP in Q2-2017, and which supports V2V/I/P/N¹ communications, and whose PC5 air-interface is specifically designed to support basic safety services via V2V/I/P at 5.9 GHz.

3GPP is now in the process of standardising (5G) NR-V2X, with specifications to be completed by end 2019, and which will complement LTE-V2X in enabling connected and automated mobility.

V2N communications

We consider that – in principle – all bands designated in Europe for ECS can be used for NR-V2N communications. These include the European pioneer 5G bands at 700 MHz, 3.4-3.8 GHz, and 26 GHz, as well as ECS bands that are in use today for 2G/3G/4G. The use of these ECS bands for V2N (either via LTE-V2N or NR-V2N) is purely a matter for the licensees (MNOs) and their business plans in relation to car OEMs.

V2V/I/P Communications

MNOs may also wish to use their licensed spectrum for V2V, V2I and V2P communications; the so-called *side-link* (in addition to uplink/downlink communications used for V2N). This would again be at the discretion of the MNOs, based on their business plans with car OEMs and road operators.

However, we note that – with the exception of certain use cases which might be tailored for specific groups of users – V2V/I/P communications require *common* and *shared* spectrum to allow communications among all users. Today in Europe, such spectrum includes the licence exempt bands harmonised for ITS at 5875-5905 MHz (expected to be extended to 5915 MHz) and at 63-64 GHz.

NR-V2X and LTE-V2X support different and complementary C-ITS use cases. We and our partners are in the process of assessing the need for additional spectrum in support of connected and automated mobility via NR-V2V/I/P, particularly at frequencies below 10 GHz. This is an area which may demand special attention from Member States and the RSPG in the near future.

8. The RSPG recognizes that, in order to support implementation of EECC, the European Commission might consider additional recommendations on spectrum use for verticals and in this case, it should seek advice from the RSPG.

We request that the RSPG accounts for our comments on Questions 4-7 in this respect.

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¹ Namely, vehicle to vehicle (V2V), vehicle to infrastructure (V2I), vehicle to pedestrian (VIP), and vehicle to network (V2N) communications.