

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

## Summary

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

With regards to the opinions expressed by the RSPG in relation to authorisation models:

- We are supportive of *individual national licences* for bands identified for 5G subject to any required protection of existing users of the said bands. Such authorisation would give mobile operators the freedom to deploy wherever there is demand for 5G, free from risks of harmful co-channel interference characterised by shared/coordinated licensing, and would bring certainly for investment in 5G infrastructure and equipment.
- We believe that such investment by mobile operators in 5G is essential, not only for the provision of eMBB to citizens and consumers, but also for the provision of 5G services to the *vertical* markets, who can gain access to 5G capacity through network slicing and benefit from the economies of scale in public 5G network infrastructure and equipment.
- Where some verticals might require *direct* access to licensed bands identified for 5G, in order to deploy their own private (dedicated) 5G networks, we note that these verticals can *lease* spectrum from the mobile operator licensees. The Member States' frameworks for authorisation of bands identified for 5G should facilitate, encourage, and incentivise spectrum leasing, and remove any barriers to such market-led approaches for access to the bands by the verticals. We consider that incentivising market-based leasing of bands identified for 5G would result in a more optimal use of spectrum than by dedicating the bands (either explicitly, or implicitly via favourable authorisation models) to special types of vertical use cases.
- We do not believe that a general authorisation (licence exemption) regime is appropriate at 26 GHz, on the grounds of unpredictable interference and the resulting adverse impact on the delivery of new (and often mission critical) 5G services. Furthermore, there are other mm-wave bands (57–66 GHz) available today through general authorisation, and so the need for considering general authorisation at 26 GHz is not evident.
- We agree with the RSPG's opinion that the 66-71 GHz band should be prioritised in terms of studies for the second stage of mm-wave 5G bands. However, we consider it premature at this stage for the RSPG to recommend general authorisation of 66-71 GHz. We consider that it would be preferable for the 66–71 GHz band to be made available on a licensed basis, as a complement to the substantial amount of underused spectrum (57-66 GHz) available today through general authorisation immediately below the band.

More broadly, we acknowledge the need for Member States to authorise access to spectrum in a way which reflects their national circumstances. However, it is crucial that this flexibility does not jeopardise European wide economies of scale in 5G radio equipment which would otherwise benefit the users.

By way of example, we refer to consultations in a Member State to consider geographic authorisation of the 3700–3800 MHz sub-band for emerging business models, including Industry 4.0.

We acknowledge the suitability of geographic licensing for some emerging business models. However, given the importance of manufacturing to the economic well-being of European Member States, and the benefits of 5G in enabling use cases such as industrial automation (smart factory), we are not convinced that the use of 3700–3800 MHz for Industry 4.0 applications in one Member State is an optimal approach in terms of reaping the benefits of EU-wide economies of scale, not to mention the opportunity costs of compromised availability of bandwidth for eMBB. We believe that there are opportunities to identify 5G bands harmonised in Europe outside 3400–3800 MHz for important vertical use cases such as Industry 4.0, which can benefit from a global ecosystem of 5G radio equipment. We strongly urge and encourage European administrations to take action to identify such harmonised 5G bands. Although we again emphasise that we consider incentivised market-based spectrum leasing to be a preferred approach for the verticals, resulting in more optimal use of spectrum.

We are supportive of the progressive release of the 26 GHz band, with 26.5–27.5 GHz released before 2020, but noting that administrations should not lose sight of the objective of making the whole 26 GHz available as soon as possible subsequently. We recommend the migration of fixed links from 26 GHz into the 32 GHz band and the E-Band, and urge administrations to plan for this eventuality as soon as possible. We also agree with the RSPG's view that administrations should work with stakeholders to ensure that any earth stations authorised in the future are deployed at geographic locations where they are unlikely to have a significant impact on 5G deployment and coverage. We consider that this approach can also be considered for some existing earth stations which might have a disproportionately negative impact on 5G deployment.

We agree on the importance of 5G coverage in rural areas and ubiquitous connectivity. We encourage the EC and CEPT to initiate – as soon as practicable – a work programme for the updating of the ECC and EC Decisions on the existing Mobile bands, to ensure their suitability for 5G networks, and also to carefully consider their positions in relation to the future role of the 470–694 MHz band and the relevant WRC-23 agenda item.

In what follows, we provide our responses to the specific RSPG Opinions and propose amendments to the text of some of the Opinions.

## Huawei's comments in relation to the draft RSPG second opinion on 5G networks

1. **The RSPG is of the opinion** that Member States will need flexibility in the way they authorise access to spectrum, for example: appropriate geographical areas (e.g. national, regional, city or hyper-local, e.g. for use in a factory), individual licensing or under a general authorisation framework.

Huawei acknowledges the need for Member States to authorise access to spectrum in a way which reflects their national circumstance and requirements. This is especially relevant in the context of

- a) sharing of spectrum between 5G networks and any existing users of bands identified for 5G, given that the extent and nature of existing use can differ widely among Member States, and,
- b) 5G network coverage and roll-out obligations, given the different geographies and geographic distribution of populations among Member States.

However, it is also crucial for Member States not to lose sight of the importance of European-wide harmonisation in order to allow citizens, consumers and vertical markets to benefit from economies of scale in 5G radio equipment.

As such, we urge administrations to exercise caution in adopting authorisation models which

- 1) might impact economies of scale by compromising frequency harmonisation across the EU; for example by authorising a segment of a pioneer 5G band according to a licensing regime (e.g., hyper local) which might favour *specific use cases*, where such authorisation is not implemented elsewhere by other administrations, or
- 2) might impact economies of scale by requiring 5G equipment to operate differently in the same band in different Member States; for example by adopting licence exemption in a segment of a pioneer 5G band where other Member States adopt licensing.

By way of example in relation to item (1) above, we refer to the recent consultations in a Member State to consider geographic authorisation of the 3700–3800 MHz sub-band for emerging business models, including Industry 4.0.

We acknowledge the suitability of geographic licensing for some emerging business models. However, given the importance of manufacturing to the economic well-being of European Member States, and the benefits of 5G in enabling use cases such as industrial automation (smart factory), we are not convinced that the use of 3700–3800 MHz for Industry 4.0 applications in one Member State is an optimal approach in terms of reaping the benefits of EU-wide economies of scale, not to mention the opportunity costs of compromised availability of bandwidth for eMBB.

We believe that there are opportunities to identify 5G bands harmonised in Europe outside 3400–3800 MHz for important vertical use cases such as Industry 4.0, which can benefit from a global ecosystem of 5G radio equipment. We strongly urge and encourage European

administrations to take action to identify such harmonised 5G bands (see also the latter part of our response to Opinion-7). Although we emphasise that we consider incentivised market-based spectrum leasing to be a preferred approach for the verticals, resulting in more optimal use of spectrum (see also our response to Opinion-7).

By way of example in relation to item (2) above:

- We are generally not supportive of *3-tiered* authorisation models which – in addition to a first tier of existing users – consider the authorisation of new users through a mixture of a second tier of licensed users and a third tier of licence exempt users, all applicable over the *same* frequencies.

This is because we consider that the risk of harmful co-channel interference over large distances would be either disruptive (if left unchecked) or overly restrictive for the lowest tier (if appropriately mitigated via technical conditions).

We consider it best to first exhaust 2-tier sharing opportunities (incumbent first tier and licensed second tier, or incumbent first tier and licence exempt second tier) before considering more complicated 3-tier sharing frameworks.

- We do not consider that shared/coordinated licensing – which at any given location authorise the use of the same frequencies by multiple independent licensees – is appropriate for pioneer 5G bands. This is irrespective of whether the sharing is coordinated by the regulator or is achieved through concurrent self-coordinated licensing.

This is again on the grounds that the risks of harmful co-channel interference among independent parties can be disruptive (especially for those use cases with mission critical requirements), and together with the burden of coordination, can be a disincentive for investment in pioneer 5G bands.

A similar issue exists at the boundaries of *geographic* (area defined) licenses, where the impact of co-channel harmful interference over large distances among independent licensees can result in sub-optimum use of the spectrum resource.

We emphasise that the 5G New Radio standardised by 3GPP is designed based on the assumption that any co-channel interference is fully under the control of the 5G network operator and can be appropriately managed through radio system design.

In light of the above, we propose the following amendments to Opinion-1:

**The RSPG is of the opinion** that Member States will need flexibility in the way they authorise access to spectrum, for example: appropriate geographical areas (e.g. national, regional, city or hyper-local, e.g. for use in a factory), individual licensing or under a general authorisation framework. **It is imperative that such flexibility does not compromise the benefits of economies of scale in 5G equipment which arise from EU-wide harmonisation.**

2. **The RSPG is of the opinion** that the Commission, together with Member States, should take actions to fully support 5G related policy objectives in rural areas and wide coverage, taking into account the role of satellite in achieving ubiquitous connectivity.

Huawei agrees on the importance of 5G coverage in rural areas and ubiquitous connectivity.

Cost-efficient provision of nationwide and ubiquitous 5G coverage requires access to spectrum below 3 GHz, and importantly, below 1 GHz. For this reason, it is imperative that

- the EC and CEPT initiate – as soon as practicable – a work programme for the updating of the ECC and EC Decisions on the existing Mobile bands, to ensure their suitability for 5G networks, and
- European administrations carefully consider their positions in relation to the future role of the 470–694 MHz band in the context of 5G and the relevant WRC-23 agenda item to be defined at WRC-19.

We do not foresee that Satellite will play a major role in the provision of 5G *radio access*. This is due to the challenges of form factor and battery life in the integration of satellite RF transceivers in mass-market 5G user equipment and smartphones.

Nevertheless, Satellite may have a role in providing *radio backhaul* for 5G in very remote areas where provision of wireline backhaul or other forms of wireless backhaul are not viable. However, even in such circumstances, it is not clear that Satellite can provide the necessary backhaul data rates or latencies expected of all 5G use cases. In this area, Satellite also faces competition from other solutions such as high altitude platforms.

In light of the above, we propose the following amendments to Opinion-2:

The RSPG is of the opinion that the Commission, together with Member States, should take actions to fully support 5G related policy objectives in rural areas and wide coverage, taking into account the future role of 470–694 MHz in support of 5G networks as well as the role of satellite in achieving ubiquitous connectivity.

3. **The RSPG recommends** that the Commission, in its research work-programs, study solutions for improving 5G connectivity and wide area coverage, especially in rural areas, thereby facilitating and progressing technology developments targeting the fulfilment of 5G related policy objectives.

No comment.

4. **The RSPG is of the opinion** that service performance and availability requirements may be relevant for some 5G cross border services to fully function and would need to be defined by the industry in a timely manner. In some cases an EU coordinated approach could be helpful in this regard to support a common European solution.

No comment.

5. **The RSPG is of the opinion** that coverage obligations can only be derived as a consequence of national policy objectives and characteristics (i.e. population distribution, geographical morphology, industrial and societal needs) and therefore cannot be harmonised on a EU-level.

Huawei broadly agrees that coverage obligations are related to national policy objectives and characteristics, and cannot readily be harmonised at EU-level.

However, there may be room to harmonise the methodologies, criteria, and metrics with which coverage obligations are specified and tested against by the various administrations. This can help streamline the task of network design by the licensees for the purpose of compliance with the obligations in different Member States.

6. **The RSPG notes** that solving issues relating to facilitating the efficient deployment of ultra-dense networks is expected to be of high importance for the rollout of 5G in dense urban areas. **The RSPG is of the opinion** that Member States should assess the need for national actions that will enable easier site authorisation and installation, in particular for small cells, in order to make timely 5G deployment possible.

Huawei agrees with the need for national actions in this respect. Specifically, in dense urban scenarios, application processes for gaining access to lamp posts and street level furniture should be streamlined and simplified, and authorisation should be of reasonable cost at municipality level, in order not to hinder effective 5G deployment.

7. **The RSPG is of the opinion** that all commercial licences in frequency bands identified for 5G within the Member States should be subject to trading or leasing to enable new market opportunities.

Huawei agrees with the RSPG's view on spectrum trading and leasing.

In our response to Opinions 8 and 9, we highlight the role of spectrum trading as a tool for defragmenting spectrum, and facilitating the availability of large contiguous assignments per licensees.

In what follows, we emphasise the importance of spectrum leasing for the availability of 5G bands for use by the vertical markets (so-called "verticals").

It is our view that frequency bands identified for 5G within the Member States should be made available via *Individual national licences*<sup>1</sup> subject to any required protection of existing users of the said 5G bands.

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<sup>1</sup> By way of clarification, we note that "individual licensing" is the opposite of "shared/coordinated licensing". The latter corresponds to the case where *multiple* independent parties are authorised to use the same frequencies at any given location (either coordinated by the regulator or through concurrent self-coordinated licensing). The former refers to the case where only a single party is authorised. "National licensing" corresponds to the case where – other than for the purpose of protecting existing users – the licensee is authorised to deploy at all geographic locations within a Member State.



We support individual national licences for the following reasons:

- National licences give mobile network operators certainty that they can deploy their networks where and when there is demand from their customers. Mobile networks evolve as operators extend coverage to unserved areas, or increase capacity at locations with high traffic. This flexibility is key for a mobile operator's business and should be preserved in 5G spectrum.
- Predictable/reliable quality of service is the basis of demand for 5G spectrum. Individual licences give mobile operators the confidence that their service will not be degraded by co-channel interference from other licensees.
- 5G will extend the capabilities of mobile networks to provide new services beyond mobile voice and broadband data, and to serve vertical markets – such as the utilities or manufacturing sectors – that have not been traditionally the customers of commercial mobile networks. However, provision of 5G will not be substantially different from today's 4G or 3G services: operators will run the networks and provide services to end users. A change in the regulatory framework for 5G will introduce uncertainty for operators, which may decide not to invest in 5G network deployments and, as a result, the use of the pioneer 5G bands will fail to develop.

Mobile network operators authorised via individual national licences will be well equipped to provide 5G services to the vertical markets. This can be achieved through innovative 5G technologies such as Network Slicing, which allows the verticals to avoid the capital and operating costs of dedicated physical infrastructures and devices, by creating a “network factory” whereby a mobile network operator can assign – via software – different slices of its network resources to a diverse range of customers and applications.

As such, we believe that there is no need for special authorisation models for the use of the pioneer 5G bands (3400–3800 MHz and 26 GHz) by the vertical markets.

However, there may be certain cases where verticals may require *direct* access to *licensed* bands identified for 5G. This might be the case, for example, for deployment of their own *private* (dedicated) 5G networks, as opposed to indirect access to spectrum via slicing of public 5G networks). In such circumstances, the verticals may **lease** spectrum from the mobile operators, for example on a geographic basis and based on their specific requirements.

The Member States' frameworks for authorisation of bands identified for 5G should facilitate, encourage, and incentivise leases by the mobile operators, and remove any barriers to such market-led approaches for access to the spectrum by the verticals. We consider that incentivising market-based leasing of bands identified for 5G would result in a more optimal use of spectrum than by dedicating the bands (either explicitly, or implicitly via favourable authorisation models) to special types of vertical use cases.

In summary, we consider that the framework of individual national licences for the provision of eMBB to consumers as well as other services to a range of vertical stakeholders should be maintained and adopted in the pioneer bands identified for 5G by the RSPG. A different approach could disrupt a well-established regulatory framework and compromise the take up of 5G services.

Finally, and importantly, where an administration might consider special authorisation models (such as geographic licensing) in parts of bands identified for 5G, with the intention of facilitating the deployment of *private* 5G networks by the verticals, it is essential that this does not compromise the availability of sufficient bandwidth for *public* 5G networks which can support eMBB as well services to the verticals.

Huawei is acutely aware of the demand for private 5G networks for certain vertical use cases. However, we also believe it is beneficial to all stakeholders to avoid a *zero-sum-game* in the availability of licensed spectrum for public vs. private 5G networks.

We consider that it is possible to identify 5G bands in Europe for licensed use by the verticals and their private 5G networks, where such bands are not subject to demand from operators of European public 5G networks, but which can nevertheless benefit from a global ecosystem of 5G radio equipment as a result of the deployment of 5G networks in the said bands in other regulatory regions.

We strongly encourage European administrations to take action to identify such 5G bands.

**8. The RSPG is of the opinion that** Member States should consider appropriate measures to defragment the 3.6 GHz band, the primary 5G band, in time for authorising sufficiently large blocks of spectrum by 2020.

Huawei agrees with the importance of defragmentation of the 3400–3800 MHz pioneer 5G band to allow large blocks of spectrum for the licensees.

Our analysis indicates that advanced 5G techniques such as massive MIMO are optimally cost-effective when used with 100 MHz contiguous assignments per licensee. To this end, and based on national circumstances, administrations will need to address the situation relating to

- a) existing non-MFCN users of the band,
- b) existing MFCN licensees in the band, and
- c) future MFCN licensees in the band,

where MFCN is the abbreviation for Mobile/Fixed Communications Networks.

For (a), defragmentation measures may include frequency and/or geographic relocation of the existing users inside and outside the band, subject to an impact assessment. In some circumstances, measures may also include a decision on the nature of the continued protection of the existing users.

For (b), defragmentation measures may include updating of the existing MFNC licences to support trading and technology neutrality. Other measures may include a frequency relocation of the licensees to a specific portion of the band, subject to an impact assessment.

For (c), measures may include a judicious design of the auction to maximise the likelihood of outcomes with contiguous assignments in frequency, and with the new and old licensees encouraged to perform spectrum trades post award in case the auction fails to result in contiguous assignments.



Further details on the above measures can be found in the ECC Report: “Guidance on defragmentation of the frequency band 3400–3800 MHz” currently being prepared by ECC PT1.

**9. The RSPG is of the opinion that** in relation to the 26 GHz pioneer band (24.25 – 27.5 GHz):

- the focus of 5G authorisations in the 26 GHz band should be on an individual licence regime. However, the possibility of a general authorisation regime under sharing conditions that protect the other users of spectrum in this band (e.g. EESS/SRS) is not excluded.

Huawei supports *individual* licensing in the 26 GHz band (see also our response to Opinions 1 and 7 with regards to our preferred authorisation models and our reasoning).

We do not consider that a general authorisation (licence exemption) model is appropriate at 26 GHz. Whilst some operators have today deployed RLANs in the 2.4 and 5 GHz bands, these are used in addition to their mobile networks and with the understanding that quality of service cannot be guaranteed under a licence exemption regime. We do not think that licence exemption, where – by definition – interference among a potentially *unlimited* number of entities is mitigated by regulatory technical conditions (including polite protocols), would be able to provide the interference free environment required to deliver many of the new (and often mission critical) 5G services.

Furthermore, there are other mm-wave bands (57–66 GHz) available today for licence exempt uses, and so the need for considering licence exemption at 26 GHz is not evident.

In light of the above, we propose the following amendments to Opinion-9:

~~the focus of 5G authorisations in the 26 GHz band should be on an individual licence regime. However, the possibility of a general authorisation regime under sharing conditions that protects the other users of spectrum in this band (e.g. EESS/SRS) is not excluded.~~

- the Commission should include as part of any technical harmonisation for the 26 GHz band, in high level terms, the requirements to maintain the possibility for continued development of incumbent satellite services (FSS and EESS/SRS). Future earth stations should be authorised based on transparent, objective and proportionate criteria to safeguard their future operations and ensuring that they are unlikely to have a significant impact on 5G deployment and coverage. Member States will remain fully responsible for granting or rejecting authorisation to a new satellite earth station application.

Huawei agrees with the RSPG’s view that any future earth stations should be authorised such that they are unlikely to have a significant impact on 5G deployment and coverage. Such impact might be the result of interference from transmitting earth stations to 5G networks, or the application of stringent restrictions on the operation of 5G networks to mitigate interference to receiving earth stations.

Huawei also agrees with the RSPG's view (see Section A2.1.4 of the consultation) that administrations should work with relevant stakeholders to ensure that any future earth stations are deployed at geographic locations where they are unlikely to have a significant impact on 5G deployment and coverage.

Moreover, Huawei encourages administrations to support relevant stakeholders in judicious geographic relocation of any *existing* earth stations which may otherwise result in a disproportionately negative impact on 5G deployment and coverage.

- Member States should make by 2020 a sufficiently large portion of the band, e.g. 1 GHz, available for 5G in response to market demand, taking into account that 5G deployment in this frequency range is expected to be used for local coverage.

The first RSPG opinion on 5G argued for member states to make part of the band available before 2020. Huawei supports this *phased* approach in order to address market demand and we think the 26.5–27.5 GHz block should be released before 2020.

Subsequently, the rest of the band should be also made available so that bandwidths of 800–1000 MHz for each licensee can be achieved (see also our response to Opinions 1 and 7 with regards to our preference for individual national licensing and our reasoning).

However, administrations should bear in mind the following considerations:

- Some operators, whose strategy does not involve early deployment at 26 GHz, might opt out of the first phase of release and bid only for spectrum released at the second phase. For such operators a phased approach will be beneficial, provided that administrations give clear guidance as soon as possible of when the rest of the band would be released. This would allow operators to choose between bidding at the early release or later at the time of release of the rest of the band.
- Our analysis shows that 400–500 MHz per licensee is required in order to provide average cell throughputs that are equivalent to those achievable in the 3400–3800 MHz band<sup>2</sup>. These are the minimum bandwidths that mobile operators might be interested to invest in at 26 GHz. However, under a phased approach, it will not be possible to achieve 400–500 MHz per mobile operator in the first phase. This may not be a problem provided that the lower block is released at a later, pre-arranged date.
- The main obstacle in many European countries is the high number of fixed links deployed in the 24.25–26.5 GHz block. We suggest that administrations serve notice of revocation to users of existing links, with a notice period agreed with the industry.
- A phased approach may result in fragmentation, when individual operators obtain spectrum blocks in both sub bands. A technology solution to this problem could be carrier aggregation, although this is likely to be suboptimal when compared to a contiguous block. A licensing solution could be a reshuffle of the band once the lower block is released. This could be market led, through a series of trades between licensees that result in contiguous blocks. It could also be triggered or enforced by the regulatory authorities.

<sup>2</sup> The average downlink cell throughput at 26 GHz with a 450 MHz bandwidth (1.6 Gbps) is equal to that at 3.5 GHz with a bandwidth of 100 MHz, for an inter-site distance of 200 metres.

As seen here, a phased release has advantages but is not without costs. If administrations follow this path, they should not lose sight of the long term objective which is an efficient allocation of the whole 26 GHz band. In order to achieve this and also to remove regulatory uncertainty, it will be key to develop a release plan that clearly lays out when and how the lower block would be released, and how fragmentation will be dealt with.

Furthermore, we acknowledge that 26 GHz is expected to be used for local coverage. But it is important to clarify that this does not imply that 26 GHz will be used exclusively in areas of high population density.

Areas of existing high mobile broadband demand are certainly the primary locations for the deployment of 5G infrastructure at 26 GHz. These include city centres, commercial business districts, train/tube stations, shopping malls, sports stadiums, densely populated residential areas etc. However, it can be readily envisaged that 5G may also be used to deliver eMBB in village centres and other clusters of population in the countryside.

One can envisage many city and town centres as candidates for contiguous coverage, starting with earlier deployments in the commercial and business districts and extending outwards. Aggressive operators may even consider contiguous outdoor coverage over larger areas, starting with smaller clusters of deployments along busy streets/roads and areas of high population. In areas of low *average* population density, single cells or clusters of cells may still be deployed to provide high capacity services where the local population density is high and/or where there is demand.

Another important application of 5G deployments at 26 GHz in rural areas is for fixed wireless access (also known as called WTTx). Gigabit access is possible for those users who can install CPEs outside their premises in order to have line of sight connection with a 5G base station at an appropriate distance. Operators in the US and Canada have concrete plans to deploy at mm-wave for fixed wireless access to serve individual premises and apartments.

Finally, it should be noted that many verticals who may benefit from 5G may very well be located in what could be categorised as rural areas, including factories and industrial complexes. Such verticals would benefit from 5G through either slicing of the mobile operators' networks, and/or through leasing of 26 GHz from mobile operator licensees (see also our responses under Opinion-7).

Accordingly, we propose the following amendments to Opinion-9:

Member States should make by 2020 a sufficiently large portion of the band, e.g. 1 GHz, available for 5G in response to market demand, taking into account that 5G deployment in this frequency range is expected to be used for local coverage in a diverse range of urban, suburban and rural areas.

- Regulatory flexibility for the progressive release of the 26 GHz band will facilitate an efficient introduction of 5G without having an unnecessary negative impact on the current users of the band. Member States should plan any migration of fixed links necessary for ensuring the availability of the band for 5G, taking into account the geographical dimension of the market demand for 5G.

As discussed earlier under Opinion-9, Huawei supports a progressive phased release of the 26 GHz band, starting with the release of the 26.5–27.5 GHz block before 2020.

We note that it may not be feasible for 5G to share the 26 GHz band with fixed links in the same geographical area. Fixed links require a high reliability and it will be difficult to ensure this if the 26 GHz band is shared. We are of the view that planning for re-farming of fixed links should commence in advance of the spectrum being released for 5G.

There is a high number of fixed links deployed in the 24.25–26.5 GHz spectrum, which can create an obstacle in many European countries to the release of the whole band for 5G. For this reason, it is recommended to first release 26.5–27.5 GHz to facilitate rapid deployment of 5G in Europe and in the longer term, a solution is needed for the lower part of the 26 GHz band.

Administrations could take the following actions to mitigate disruption to fixed links users:

- Stop issuing new licenses for fixed links in this band as soon as possible.
- Provide notice to existing users of the revocation of licenses after a period of time.
- Put in place a programme of migration to other fixed service bands that could be well suited for 5G backhaul.

Possible target bands for migration of fixed links are the 32 GHz band and the E-Band (71–76/81–86 GHz); 32 GHz due to its very similar propagation characteristics to 26 GHz and its low current usage; E-Band due to the large available bandwidths for the support of eMBB backhaul.

It is also noted that, as the fixed link operators are often the same as the expected 5G operators, there may be ways to come to an agreement with the operators as to how they might be able to use the same frequency band for 5G access in densely populated areas and for backhauling in other areas.

3GPP is also developing 5G technology to enable the option for MNO in-band backhaul (self-backhauling) so that 5G base stations can be rapidly deployed and then the traffic backhauled by the MNO using the same spectrum. This enables base stations to provide communications between the end user device and also other base stations in the same spectrum.

Finally, as also discussed earlier under Opinion-9, while we expect 26 GHz to be used for the provision of relatively short range communications (50–100 metres cell radius), this can be in a range of diverse geographic areas. Accordingly, one cannot necessarily rely on geographic separation as a means of mitigation of interference between 5G networks and existing fixed links.

For this reason, we propose the following amendments to Opinion-9:

Regulatory flexibility for the progressive release of the 26 GHz band will facilitate an efficient introduction of 5G without having an unnecessary negative impact on the current users of the band. Member States should plan any migration of fixed links necessary for ensuring the availability of the band for 5G, taking into account the ~~geographical dimension of the~~ market demand for 5G.

10. **The RSPG is of the opinion** that general authorised frequency use can be an important breeding ground for innovation and contributes towards a dynamic market environment. The application of a general authorisation regime is foreseen in the 66-71 GHz band which could be an important band for 5G.

Huawei acknowledges the roles of both individual licensing and general authorisation (licence exemption) in the provision of innovative wireless services via 5G.

However, we note that there is already a substantial amount of lightly used mm-wave spectrum with a global co-primary Mobile allocation, in the form of the 57–66 GHz band, available for use in Europe under a general authorisation regime and on a technology neutral basis.

In short, there are no regulatory barriers for the use of the 57–66 GHz band by the unlicensed mode of the 5G New Radio air-interface which is expected to be standardised by 3GPP under Release 16.

Given the availability of 57–66 GHz today, we do not foresee a demand for *additional* licence exempt spectrum for 5G at mm-waves. For this reason, we consider that it would be preferable for the 66–71 GHz band to be made available on a licensed basis, as a complement to the licence exemption regime currently adopted in the adjacent 57–66 GHz band; or that at least it is premature at this stage for the RSPG to recommend general authorisation of 66–71 GHz.

Accordingly, we propose the following amendments to Opinion-10:

~~The RSPG is of the opinion that general authorised frequency use can be an important breeding ground for innovation and contributes towards a dynamic market environment. The application of a general authorisation regime is foreseen in the 66-71 GHz band which could be an important band for 5G~~ **the 66-71 GHz band should be prioritised in terms of studies for the second stage of mm-wave 5G bands.**

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