Huawei response to the Radio Spectrum Policy Group public consultation: DRAFT RSPG Opinion on spectrum related aspects for next-generation wireless systems (5G)

Summary

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

In summary, our views are as follows:

- Huawei considers the **3400–3800 MHz** band to have the highest priority for the initial deployment of 5G in Europe, and for the cost-effective delivery of 5G services addressing all 5G usage scenarios[1] for the benefit of European consumers. We also suggest that the 3800–4200 MHz band should be made available for 5G at a later stage.

- Huawei notes the importance of the **700 MHz** band (already harmonised for electronic communications services) in the pre-2020 deployment of LTE-A and LTE-A Pro technologies for wide area coverage mobile broadband and IoT applications in many European countries. We also expect the longer term use of the 700 MHz band for deployment of future releases of LTE for IMT2020 (5G), and of 5G New Radio. Such use may include provision of a wide area coverage sub-1GHz control plane anchor to assist 5G New Radio operation at higher frequencies.

- Huawei would welcome a RSPG Opinion **in 2016** on pioneer 5G bands **below 6 GHz** in Europe.

- Huawei believes the **24.25–27.5 GHz** band should be the pioneer 5G band above 6 GHz in Europe, subject to European harmonisation measures, and as a complement to the 3400–3800 MHz band.

- The **24.25–27.5 GHz** band would benefit from a common tuning range with the 28 GHz band, would provide a substantial amount of bandwidth with good coverage/capacity characteristics, and importantly, would offer the greatest potential for global harmonisation.

- Huawei supports the **37–43.5 GHz** band as a complement to the 24.25–27.5 GHz band for inclusion in further European harmonisation measures (recognising that some issues would need to be addressed in the 37–40.5 portion).

[1] eMBB: enhanced Mobile Broadband, mMTC: massive Machine Type Communications, URLLC: Ultra-Reliable and Low-latency Communications, as defined in ITU-R WP-5D M.2083, IMT-2020 Vision.

- Huawei considers that the **31.8–33.4 GHz** band faces certain issues as a candidate for 5G due to the limited amount of potentially available bandwidth (1.6 GHz), difficulties of global harmonisation, and requirement for compatibility with immediately adjacent passive bands.

- Huawei cautions against any pre-mature decisions in 2016 in identifying a suitable European pioneer 5G band **above 6 GHz**. Europe should take sufficient time to assess the different options, accounting for developments that are ongoing outside of Europe to ensure the greatest possible global harmonization. We consider that the timelines set out in the RSPG work programme are appropriate for this purpose, with a stable RSPG Opinion on the pioneer 5G band in Europe in the **second half of 2017**.

The opinion of the RSPG on the strategic roadmap towards 5G for Europe

1. The RSPG considers the 3400–3800 MHz band to be the primary band suitable for the introduction of 5G use in Europe even before 2020, noting that this band is already harmonised for mobile networks, and consists of up to 400 MHz of continuous spectrum enabling wide channel bandwidth. This band has the possibility to put Europe at the forefront of the 5G deployment.

Huawei agrees with the RSPG's opinion.

We consider the 3400–3800 MHz band to have the highest priority for the initial deployment of 5G in Europe. We expect this availability to be extended to 3800–4200 MHz as a second step.

We consider the band 3400–4200 MHz to be a key element in the development of 5G, and for the support of wide area coverage enhanced mobile broadband, massive machine type communications and of critical and real time communications for high reliability or extremely low latency applications.

We consider the availability of 800 MHz of contiguous spectrum to be an important element for the establishment of the highest performing 5G networks in a multi-operator environment globally, both in terms of the development of a vibrant device eco-system, and in terms of facilitating the evolution of mobile networks from existing 4G technologies to new air interfaces, with the possibility of making 5G available to European citizens cost effectively.

2. The RSPG is of the opinion that 5G will need to be deployed also in bands already harmonised below 1 GHz, including particularly the 700 MHz band, in order to enable nationwide and indoor 5G coverage.

Huawei agrees with the RSPG's opinion, but with some caveats.

We note that the 700 MHz band has been auctioned in Germany and France recently, and further auctions will take place in European countries in the coming months. We expect roll-outs of 4G (LTE-A) to take place in several European countries well before 2020. We also note that the 700 MHz band is emerging as an important band for IoT applications and M2M communications based on LTE-A evolution (i.e., LTE-A Pro).

Huawei encourages efforts from Member States to ensure the early availability of 700 MHz for 4G (LTE-A) systems in a coordinated manner across Europe.

Looking ahead to the future, the 700 MHz band can also be used for the deployment of later releases of LTE which will be approved by 3GPP as part of 3GPP IMT-2020 (5G) submissions to the ITU-R, as well as for 5G New Radio.

With its nearly global footprint, the 700 MHz band can provide (again via later releases of LTE or low-frequency 5G New Radio) a sub-1GHz anchor for the 5G control plane in order to assist the operation of 5G New Radio at higher frequencies.

Furthermore, Huawei considers sub-700MHz as a 5G candidate band in the longer term. We believe that Europe should take into account the deployments at sub-700MHz in other Regions in developing its long-term strategy for the use of UHF.

3. The RSPG considers that there will be a need to ensure that technical and regulatory conditions for all bands already harmonised for mobile networks are fit for 5G use.

Huawei agrees with the RSPG's opinion.

We consider that technology and service neutrality are important cornerstones of progressive spectrum regulation; the market is best placed to decide on the most appropriate technology and service in any band. As such, we consider that all bands that are already harmonised for electronic communications services should be available for use by all 5G applications, and subject to technical conditions that are least restrictive.

With specific reference to the 3400–3800 MHz band, current assignments of spectrum usage rights across Europe are far from allowing wide contiguous channels (i.e., larger than 40 MHz) in the great majority of European countries. This fact does not align well with the standardization efforts in 3GPP aiming at 5G channel bandwidths of 80 MHz and beyond. CEPT, BEREC, RSPG, and EC should encourage actions at national level that will alleviate such fragmentation issues in this frequency range and elsewhere. We acknowledge that the situation becomes more involved with the existence of incumbents.

In order to address this situation, European regulators should take necessary actions, for example, by considering 3400–3800 MHz as a whole rather than two separate bands (namely 3400–3600 and 3600–3800 MHz), and by sharing best practices on auctioning the 3400–3800 MHz band and on approaches to manage the incumbents.

Furthermore, we support CEPT to undertake activities that will assess the suitability for 5G of the existing least restrictive technical conditions which were originally defined for 4G.

4. The RSPG stresses that there are many frequency bands above 24 GHz which are of potential interest for 5G in Europe:

- To give sufficient guidance to industry, the RSPG will aim to identify at the earliest opportunity a suitable band to be made available in Europe. In order to do this RSPG members will prioritize the necessary work to assess what would be involved in enabling access to each candidate band in their country.
- In this regard the RSPG believes that global harmonisation will be essential for developing 5G.
- The RSPG will define the timeline for availability of other bands taking into account sharing and transition challenges, for example for mobile access and fixed services (including backhauling).

Huawei agrees with the RSPG's opinion, with some caveats.

We would welcome a RSPG Opinion in 2016 on 5G pioneer bands below 6 GHz for Europe. However, we consider that a RSPG opinion in 2016 for a 5G pioneer band above 6 GHz might be pre-mature.

We consider that there is no need to rush to an opinion in 2016 given that

a) we see that the initial focus of the market will be on spectrum below 6 GHz,
b) 3GPP has only just begun its 5G study items, with the first 5G release expected towards the end of 2017,
c) there is still some lack of information on incumbent use of the candidate bands, and we expect meaningful sharing studies to begin in earnest at CEPT only in 2017, and
d) an early decision in Europe may risk a sub-optimal outcome in the context of global harmonisation and fragmentation; a risk which could be mitigated by discussions with some of the key countries in other Regions.

We consider that the dates set out by the RSPG in its work programme for the identification of appropriate frequency bands for 5G in Europe to be appropriate; that is to say, an interim Opinion by Feb-2017, a draft Opinion by Nov-2017, and a final Opinion by Feb-2018.

We believe it is critically important to achieve at least multi-regional harmonisation of the 5G bands and to avoid global fragmentation. We consider that this can best be achieved by a considered analysis of the options as outlined in the RSPG and CEPT work programmes, with a stable position in the second half of 2017.

5. The RSPG believes that considerations of bands above 6 GHz for 5G shall be limited to the bands listed by WRC-15 in order to strengthen the global harmonisation opportunities. This work should focus on the frequency bands proposed by Europe, in particular the bands 24.5–27.5 GHz, 31.8–33.4 GHz and 40.5–43.5 GHz. The RSPG intends to identify which one of these could be harmonised in Europe for early implementation.

Huawei agrees with the RSPG's opinion, with some caveats.

We consider that the bands 24.25–27.5 and 37–40.5/40.5–43.5 GHz can be the most important bands above 6 GHz for 5G globally.

Specifically, we consider that the band 24.25–27.5 GHz can be made available for 5G in Europe in the short term, and

- can provide significant amounts of bandwidth, and good coverage/capacity,
- would benefit from economies of scale due to a common tuning range with the adjacent 28 GHz, and
- offers a high potential for global harmonisation considering initial views from other Regions.

As such, we would welcome the selection of 24.25–27.5 GHz as the candidate for a first phase of EU harmonisation measures on 5G spectrum, complementing 3400–3800 MHz.

According to preliminary analysis of available information on incumbents at 24.25–27.5 GHz, Huawei believes that the band has high potential to also accommodate 5G. We expect that this will be confirmed through compatibility studies based on the information provided by administrations and industry in response to the CEPT Questionnaire[2].

[2] http://www.cept.org/cept/start-page/questionnaire/?sqid=p63a6yg6hnt6edk3ftpr

In addition, we recommend that Europe could also consider further future harmonisation measures for 37–40.5/40.5–43.5 GHz as a complement to 24.25–27.5 GHz (recognising that some issues would need to be addressed in the 37–40.5 portion).

Finally, we consider that the band 31.8–33.4 GHz faces certain issues as a candidate 5G band. This is because

- the maximum amount of potentially available bandwidth is limited (only 1.6 GHz),
- the actual usable bandwidth might be further limited by the requirement to protect passive services in the immediately adjacent 31.3–31.8 GHz band, and
- importantly, it is problematic in terms of global harmonisation.

6. The RSPG will keep under review whether there is any requirement for European harmonisation measures in bands above 24 GHz before WRC-19.

Huawei agrees with the RSPG's opinion.

We consider that it might be helpful for Europe to take part in WRC-19 from a position of global leadership, having already established harmonisation measures in the form of Commission and ECC Decisions on a pioneer 5G band in Europe.

7. The RSPG will prepare a supplementary opinion elaborating on the implementation of this opinion taking also into account the wider RSPG work programme, in particular the working groups on IoT and ITS.

Huawei agrees with the RSPG's opinion.

We consider that given the importance of 5G in supporting enhanced machine type communications and ultra-reliable low-latency communications, 5G spectrum availability should be addressed holistically, and through consideration of IoT and ITS.

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