Deutsche Telekom Comments on the Draft RSPG Opinion on Spectrum related aspects for next-generation wireless systems (5G)

Deutsche Telekom (DT) highly appreciates the opportunity to comment on the draft RSPG opinion on spectrum related aspects for next-generation wireless systems (5G) (RSPG16-031final).

Strategic Roadmap towards 5G for Europe

DT supports the overall target to develop a strategic roadmap towards 5G to make 5G-based services available to all European citizens in a timely manner. DT would like to emphasize the idea of 5G being designed as a "system-of-systems" and making use of already established technologies but under a new orchestration. Therefore DT proposes to add the following text at the end of the introductory paragraph (page2):

"One important element for 5G-services will be the availability of mobile access. The 5G mobile access will be composed of multiple air interfaces, which include evolved legacy technology such as e.g. Long Term Evolution Advanced (LTE-A) as well as new air interface variants, which may be tailored to particular services or frequency bands. So the deployment of a dedicated 5G-service does not necessarily imply the introduction of a new air interface."

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 harmonized 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.**

   In principle DT agrees the 3400-3800 MHz band is suitable for initial and long term 5G-service deployments. However, DT is of the view that this frequency range should be extended up to 4200 MHz. The entire range 3400-4200 MHz would allow for the high data rates which are expected to be essential for 5G-services. With a contiguous bandwidth of then 800 MHz this range could become a key band for the introduction of a new air interface.

   DT asks RSPG to also support the consideration of the band 3800-4200 MHz as a candidate for 5G although not being listed in agenda item 1.13 for WRC-19.

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

   DT would like to emphasize that the deployment of 5G services will also require spectrum suitable for wide area coverage to provide nationwide services. This would include the 700 MHz band but also other bands below 1 GHz. In this respect it has to be noted that 5G is being designed to integrate 4G radio technologies and that operators, following the launch of 5G, will most likely run a combination of 4G/5G network layers for many years. The operator should have the freedom to manage the migration of customers, traffic and spectrum resources between 4G and 5G. The deployment of 5G-services could initially also been realized by re-using evolved legacy technologies in particular when the advantages of a new radio interface can't be immediately materialized in dedicated bands. This may be in particular true for the 700 MHz band.

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

   DT believes that all legacy bands, also including the 450 MHz band, will be in focus for 5G-service deployments, but not in the introduction stage since many of these bands will be heavily used for legacy services. In principle the operators should have the choice to decide which existing or new bands should be used for the roll-out of a wide variety of 5G-services. This implies the continuity of service and technology neutrality in the regulation and the possibility and permission to re-farm existing bands without any undue regulatory provisions or fees to maximize the efficiency in spectrum usage. Although the 5G development hasn't been finalized yet it is already obvious that there is a need for high network infrastructure investments. With the digitalization of the industry mobile networks become more critical to the entire economy requiring constant updates and investments in infrastructure. This should be reflected in a more investment supportive licensing approach by granting spectrum usage rights for periods not less than 30 years with the presumption of renewal to allow operators to optimize their investment cycles over the long term to the benefit of all customers.

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 harmonization 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).**

   DT supports the idea to provide guidance to identify at the earliest possible point in time a suitable band for 5G in Europe as long as this will not prevent from the achievement of global harmonized resources for 5G. Global harmonization is a key element for the creation of economies of scale and thus a major success factor for 5G. Technical opportunities such as grouping of regional bands in tuning ranges should be also taken into account.

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 harmonization 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 harmonized in Europe for early implementation.**

   DT supports the decision of WRC-15 to study a number of bands above 24 GHz. Concerning the bands above 24 GHz being proposed for ITU-R studies the first preference of DT for the development of a 5G eco-system in Europe and other world regions are the ranges 24.25-27.5 GHz and 31.8-33.4 GHz. Both bands have better propagation qualities as well as the possibility of synergies with the 28 GHz band, which is being considered outside Europe such as in the US, Korea and Japan. That may provide an opportunity for earlier availability of 5G equipment in this frequency ranges.

   However, DT believes that there is still the need to also consider the frequency range below 24 GHz and to evaluate whether there are opportunities to allocate further spectrum for 5G, even if this is not yet part of the current studies at ITU-R and even if only possible within EU/CEPT. This frequency range shows the best compromise between the demand for high bandwidth and respective high data rates while still allowing for an economically advantageous deployment.

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

   In principle DT supports the work of ITU-R for achieving global harmonization of spectrum usage and thus enabling benefits from economies of scale. However, in order to keep up with other regions in the world where harmonization measures are already under way DT believes that European harmonization measures in bands above 24 GHz before WRC-19 are an important element for Europe being at the forefront of 5G development and deployment.

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

   DT believes that IoT services are or will become an integral part of 5G use cases and can be delivered by using both 4G and 5G technology or a combination of them. This should be reflected in the service/technology neutral regulatory framework. DT doesn't see a need for dedicated spectrum specifically for IoT services since the licensed spectrum will in principle have the capabilities to support IoT services. However, since IoT services are expected to heavily grow and raise the overall traffic this should be considered in the evaluation of the overall 5G spectrum needs. Licensed spectrum will be essential to deliver the required high quality and reliability for IoT services.

   DT is of the view that also ITS services in general will make use of the 4G and 5G network infrastructure. However, V2V communication requires additional deployment of LTE in the 5.9 GHz license-exempt band.