TELEFÓNICA response to RSPG16-031 FINAL

Draft RSPG Opinion on spectrum related aspects for next-generation wireless systems (5G)

29 July 2016

General Comments

Telefónica welcomes and supports the RSPG initiative of delivering an early opinion on spectrum aspects of 5G. A sound expectation that spectrum will be available in sufficient supply is key to incentivize investments, underpin the development of 5G standards and ensure that the benefits of the new technology reach all European citizens. Conversely, an anticipation of artificial spectrum scarcity, high spectrum prices and delays in availability hampers the business case for 5G and would perpetuate the mobile connectivity gap with other regions. The RSPG initiative is therefore a helpful step in the right direction.

5G investments are different in one important respect: they entail a higher risk for European operators than previous recent changes in the radio air interface and network architecture. On the supply side, a new architecture and interface would provide much lower latencies and higher reliability, both of which would not be achievable only through more spectrum assignments or increased densification. However, the value of these new capabilities relies on the integration of the communication service with the offerings of verticals, and is therefore not completely in the hands of mobile operators. On the demand side, as with any new service, adoption by end users is a challenge, exacerbated in Europe by the difficult macroeconomic environment that seems to have placed a ceiling on spending in telecommunications. Analysis Mason[1], for example, reports that telecommunications services retail revenues dropped in Western Europe from 49.42 euros per head of population per month in 2008 to 42.68 in 2014, a reduction of 14%. In North America, they have risen over the same period by 6%, from 86.91 USD to 92.30 USD. At current exchange rates, North Americans spent in 2014 on telecommunications 40% more per pop than Western Europeans. Most importantly, they place a higher value on quality upgrades.

Generating incentives for mobile operators to actively engage in the development of 5G services and technologies, and to commit resources in its deployment across Europe, is a necessary condition for the 2020 target to be met. Mitigating risk is the best way to create those incentives, and in Telefonica's view it should be the main driver of the strategic roadmap. From a spectrum perspective, risk can be reduced in at least two ways. First and foremost, as many bands as possible should support 5G, both from a standards perspective and from a regulatory perspective. A predictable and large spectrum supply is key to prevent monopoly rents in the primary or secondary spectrum markets, soften the expectation of disproportionately high fixed spectrum costs that drive investors away, and foster the quick adoption of technology standards and cooperation agreements between telecom operators and verticals.

Secondly, liberalization should be used strategically to accelerate the development of 5G. Mobile operators already hold non-neutral spectrum licences in bands potentially valuable for 5G, and in some cases already identified for further study at WRC-15. In general, they are currently used for fixed wireless services. Liberalizing those licences would induce the current licensees to accelerate their 5G plans, and to efficiently deploy one service or the other depending on the circumstances. Fixed links and small cell 5G deployments, for example, are to a large extent complementary (fixed links are valuable in less densely populated areas not covered by fibre; 5G small cells are more valuable in dense areas).

[1] Analysys Mason (August 2015). North America telecoms market: trends and forecasts 2015–2020; Western Europe telecoms market: trends and forecasts 2015–2020

Additionally, in some European countries the licences are national or cover a large geographic area, facilitating liberalization and change of use. It should be noted in this respect that nearly 80% of the 3.85 GHz of licensed spectrum for flexible use in mmwave-bands recently made available in the United States consists of liberalized Fixed Wireless Access licences, a large part of which has been acquired in recent years by mobile operators.

Specific Comments

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.

Telefónica agrees that the 3400-3800 MHz band is well suited for early 5G deployments. It is already licensed in part to mobile operators across Europe on a technology neutral basis, and is wide enough to allow the channels of more than 100 MHz per operator that are needed to support the Gbit/s speeds expected from 5G. RSPG should start as soon as possible the process of confirming the band plan and ensuring the full 400 MHz is assigned for mobile use.

Telefónica believes that TDD will be the preferred duplexing mode for this band. It is sensible therefore to ensure that assignment procedures in the primary market are based on unpaired blocks, and that Member States facilitate the change of existing paired licences into contiguous holdings. This should however not prevent a change of duplexing mode in the future. Given the early stage of development of the standards, licences should be as flexible as possible, including the option to deploy either FDD or TDD, subject to other technical rules introduced to manage interference.

The European institutions should also consider the possibility of taking harmonizing measures in the future extending the band at least on the upper end, to include 3800-4200. RSPG already asked in 2013[2] the European Commission to study the possible application of sharing techniques in Europe in this frequency range, to facilitate the introduction of IMT, and the recent OFCOM consultation[3] hints that at least in some countries existing uses could share the band with mobile services. A similar conclusion was reached by Plum in its 2015 study[4] for Ericsson, Huawei and Qualcomm.

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.

Telefonica agrees that 5G will require a coverage layer using spectrum below 1 GHz. It is however important to avoid the expectation that holding assets in a particular band is necessary for 5G deployments. Ensuring that 5G handsets and IoT terminals will support 800 MHz and 900 MHz is just as important as ensuring that there are no undue delays in the release of 700 MHz and that, if they happen, their impact is minimal.

[2] RSPG (2013). "Opinion on strategic challenges facing Europe in addressing the growing spectrum demand for wireless broadband". RSPG13-521

[3] OFCOM (2016) "3.8 GHz to 4.2 GHz band: Opportunities for Innovation". Consultation Document.

[4] PLUM (2015) "Use of C-Band (3400/3600-4200 MHz) for mobile broadband in Hungary, Italy, Sweden and the UK"

The target of launching 5G services by a particular date is a valid political objective but should not lead to imposing coverage requirements for specific technologies in spectrum licences. Operators are likely to operate a combination of 4G/5G network layers for many years following the launch of 5G. It is vital that they have control over how they manage the migration of customers, traffic and spectrum resources between 4G and 5G. The decision to deploy 5G should ultimately be a commercial decision.

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.

Telefónica has always stressed the need to accelerate the putting into practice of the principles of technology and service neutrality, and fully agrees with RSPG that there should be no technical or regulatory conditions that constrain or prevent 5G use in bands already harmonised for mobile networks. By extension, technical and regulatory conditions in new bands should also be fit for 5G.

Telefónica encourages in particular RSPG to explore whether field strengths limits and/or block edge masks need to be re-specified to facilitate the deployment of 5G, and looks forward to engage in this discussion in the relevant technical bodies.

It should also be noted that a short time left in the licence term precludes operators from investing in band-specific assets. Even if a band supports 5G, operators are unlikely to invest if there is not an expectation of retaining the spectrum usage rights for a sufficiently long period. To prevent this problem in the future, Europe should move to longer licences with expectations of renewal, in line with the US and the UK.

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).**

Telefónica wishes to emphasize that as long as the principles of service and technology neutrality are respected and incumbent users are treated fairly, there is little risk in identifying too many bands as 5G candidates. Conversely, lack of ambition carries the risk of creating bottlenecks and artificial scarcity.

To the extent that prioritization is needed, Telefónica agrees that the potential for global harmonisation is a key requirement when the status quo in Europe is heterogeneous and a synchronized release is difficult or not required by prospective end users. However, the

number of bands that can be globally harmonised is limited, and other bands should not be discarded too early if regional scale can be achieved.

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.

Telefónica disagrees that considerations of bands above 6 GHz should be limited to those listed by WRC-15. Below 24 GHz there are possibilities that should be explored, in particular the 9.9-10.6 GHz band which we think may provide good outdoor coverage and enough capacity to complement the other bands under study.

Above 24 GHz, the US and Asia-Pacific will likely use the 28 GHz band for the first 5G deployments, despite the fact that it is not in the WRC-15 list. Whilst in these high frequencies it is enough to share a common tuning range to benefit from economies of scale, the example shows that focusing exclusively on the WRC-15 list could lead to missed opportunities.

Of the three bands suggested by RSPG above 24 GHz, Telefónica suggests to focus the efforts on 24.5-27.5 GHz and 40.5-43.5 GHz. As long as the tuning range of equipment includes the 28 GHz band in the first case, and the 37.0-40.5 GHz band in the second case, global scale can be achieved in these two bands.

The 31.8-33.4 GHz band is in our view less interesting. It is narrower than the other two and regional scale would need to be achieved.

We also see good prospects of global scale in 66-76 GHz, and recommend RSPG to take it into consideration.

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

Telefónica believes that there is a high likelihood that harmonisation measures will be required in bands above 24 GHz before WRC-19. Other regions are considering mmwave-bands as priority bands for 5G, have already licensed them and commercial deployments are planned before 2019.

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.

Telefónica shares the view that the Internet of Things and Intelligent Transport Systems are closely related to 5G and welcomes close coordination among the three working groups. Most relevantly, the shared vision of the industry is that 5G will be able to meet the needs of both IoT and ITS, and there should be no need to reserve spectrum specifically for those two groups of services.