

Qualcomm response to Ofcom consultation on

The future role of spectrum sharing for mobile and wireless data services

Licensed sharing, Wi-Fi, and dynamic spectrum access

November 2013

Qualcomm greatly appreciates the opportunity to provide its response to Ofcom public consultation on “The future role of spectrum sharing for mobile and wireless data services. Licensed sharing, Wi-Fi, and dynamic spectrum access”.

Mobile data traffic has doubled every year over the past few years. If this growth rate continues for ten years, we will see a 1000x increase. In the UK, mobile broadband traffic has doubled between 2011 and 2012 according to the Ofcom commissioned report on Infrastructure¹. Higher access throughput and thus larger channel bandwidths up to 100MHz will be required to accommodate this demand. This pace of growth challenges in a number of aspects the traditional spectrum licensing approach.

More licensed spectrum in prime bands - meaning that the spectrum is harmonized, ideally globally - is needed. This spectrum should also be released quickly to avoid a crunch that, if unsolved, will lead to higher prices, degraded quality and data caps, and missed industrial and innovation growth opportunities. However, this regulatory path is not always possible and the implementation of LSA (Licensed Shared Access) responds to the need for additional prime harmonised spectrum, to be released in a timely manner to increase the capacity and quality of mobile broadband access. In this form of implementation, LSA corresponds to Authorised Shared Access (ASA) which has been promoted and backed by the mobile industry².

¹ Ofcom report on infrastructure: <http://stakeholders.ofcom.org.uk/market-data-research/other/telecoms-research/broadband-speeds/infrastructure-report-2012/>

² <http://www.gsma.com/spectrum/wp-content/uploads/2013/04/GSMA-Policy-Position-on-LSA-ASA.pdf>

Increasing spectrum supply and better managing its use

Q7: Which frequency bands are most likely to be best suited to providing geographical shared access, including via a geolocation database approach, for use by mobile broadband, for example small cells and M2M applications?

Q8: Would access to these bands best be realized through licensing or license exemption?

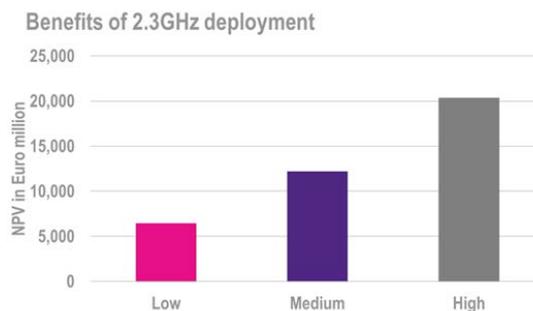
Qualcomm believes that frequency bands best suited to providing geographical shared access for use by MBB should be selected from those that are harmonized or are earmarked for global harmonization in the future so that commercial devices will be readily available and the entire value chain can benefit from the widest possible economies of scale.

The 2.3GHz and the 3.6 - 4.2 GHz frequency bands are certainly best suited for this purpose and the access to these bands can be best realized through LSA. In particular, the industry - highly committed to the implementation of LSA MBB timely - believes that the first practical implementation of LSA in Europe can begin as early as 2015 in the targeted 2.3GHz candidate band.

2.3 GHz Band

The 2.3GHz band (3GPP band 40) is already used by mobile broadband networks around the world and implemented in many devices. According to GSA, 112 devices³ already support LTE in the 3GPP Band 40. The release of the 2.3 GHz band on an LSA basis through geographic or time sharing will enable its efficient use without any changes to the devices.

Such use will foster the development of innovative services and drive considerable social and economic benefits. Those benefits have been assessed and described in a new study by Plum Consulting called “the economic benefits of LSA in the 2.3GHz in Europe”. It has been shown that the net economic benefits for Europe derived from LSA implementation at 2.3 GHz could be as much as €22bn (Figure 1).



Source: Plum Consulting

Figure 1: Benefits of 2.3GHz LSA in Europe (Source: Plum)

³ Source GSA: http://www.gsacom.com/news/gsa_374.php

Qualcomm believe that LSA will be a key tool for Ofcom and the Ministry of Defence to make available additional spectrum in the 2.3 GHz, beyond the 40 MHz currently considered, in line with the harmonised framework being developed by CEPT.

CEPT, ETSI and the RSPG have all been working on the harmonised use of 2.3 GHz for mobile broadband under an LSA framework:

- An ECC Decision is planned for approval in June 2014. It provides the harmonised technical rules for mobile broadband use and guidelines for LSA implementation in the band.
- A draft ECC Report 205 was recently approved for public consultation by CEPT WG FM. It provides an overall definition and guidelines for the implementation of LSA.
- ETSI had also published a System Reference Document defining the criteria and operational features for ASA/LSA at 2.3 GHz following a mandate from the European Commission⁴ and approved a work item on the requirements for LSA in the band: “System requirements for operation of Mobile Broadband Systems in the 2300-2400MHz band under LSA regime”.
- Furthermore, the RSPG recommended the European Commission to consider adopting complementary measures to further promote shared and flexible use of the band between wireless broadband applications and other services, based on LSA regulatory provisions, facilitating the long-term incumbent use of the band in the territory of those Member States that wish to maintain such use⁵.

LSA does not only increase the global footprint of IMT bands but also speeds up the availability of this spectrum on a regional basis. It took nearly 8 years from the IMT identification of the 2.1GHz band to the first releases of this spectrum in Europe. This period went up to 10 years for the 2.6 GHz band. With the 2.3 GHz, which was identified for IMT by the ITU in 2007, the period would have been even longer if LSA was not used to enable a positive decision by the ECC to harmonise this band. Shortening the time needed between the identification of a band for IMT and its actual release will be critically important going forward to cope with the explosive growth of data traffic. This is the genesis of LSA.

Qualcomm would therefore invite Ofcom to include LSA in the list of priorities both to maximize spectrum release at 2.3 GHz and to shape LSA definition and endorsement at European and global levels.

⁴ [http://docbox.etsi.org/RRS/RRS/05-CONTRIBUTIONS/2013/RRS\(13\)022025_TR_103_113_SRDoc_on_MBS_in_the_2300_MHz_2400_MHz_band_und.docx](http://docbox.etsi.org/RRS/RRS/05-CONTRIBUTIONS/2013/RRS(13)022025_TR_103_113_SRDoc_on_MBS_in_the_2300_MHz_2400_MHz_band_und.docx)

⁵ RSPG13-521 rev1: “Draft RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband” – DG CNECT/B4/RSPG Secretariat, June 2013

3.6-4.2 GHz

While macro cells operating at frequencies below 3GHz have so far dominated the mobile network operators' rollouts, higher frequencies will be a key marker of the future. Given current traffic requirement trends, access providers are increasingly looking at heterogeneous networks (HetNets) in which the wide-area coverage layers are integrated with other layers of 'small cells' to provide additional capacity where needed.

With its larger available spectrum, the overall 3600-4200 MHz range will play a more prominent role in the future, as traffic grows and the frequencies below 3GHz become busier. The shorter electromagnetic propagation distances make these higher frequencies especially suitable for densified network rollouts where interference could otherwise become unmanageable. Such higher frequencies are set to play a substantial role in the LTE evolution paths.

The future utilization of the 3600-4200 MHz range on a global scale is being discussed within the preparation of the WRC-15, targeting smooth coexistence between IMT networks and the incumbent services namely to the Fixed Satellite Service. With specific reference to the 3800-4200 MHz range, such discussions are in line with statements recently provided by the Radio Spectrum Policy Group in its "RSPG Opinion on strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband"

Qualcomm believes that this spectrum can play a role in the future to enhance capacity requirements in urban areas especially in light of the increased focus on very high data rates and mobile network densification including small cells deployments. This can contribute to capacity increase and effectively tackle indoor data usage. The access to this spectrum through an LSA framework would allow maintaining satellite usage while enabling a rapid access to this important resource.

In the United States, ASA/LSA is also under consideration by the FCC for the use of 3.5GHz for mobile broadband on a shared basis with coastal radars⁶. Similarly countries in Latin America and Asia are also considering ASA/LSA regulatory framework to increase the availability of various IMT bands.

Qualcomm would therefore invite Ofcom to consider LSA to maximize spectrum release at 3.6 – 4.2 GHz.

Q 10: Do you believe **DSA** could play an important future role in the future in enabling a better quality of service and low barriers to spectrum access alongside conventional licensed and LE spectrum approaches?

There are a number of spectrum management tools and sharing policies options, which complement each other. In such context, it is important to clearly define the new regulatory notion when introducing it, so that economic players can assess whether this specific model fulfills their business requirements or not. This is particularly relevant to DSA taking into account the various sharing

⁶ http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-12-148A1.pdf

mechanisms concepts and ideas floating around. Qualcomm believe that DSA concept and associated definition is unclear and should they remain unclear, investment by the industry in developing the corresponding technologies and business models will be hampered, and implementation of the concept will not happen. As it is today, DSA is open to different interpretation and this is a roadblock preventing implementation.

Typically LSA can be considered as a DSA component as geographical and/or time sharing under LSA could be dynamic, subject to the following key definition elements which have been reflected in ECC Report 205 and RSPG Opinion on LSA:

- LSA is binary as it admits spectrum use by either the incumbent or the LSA licensee. The LSA licensee enjoys exclusive spectrum rights of use where and when the spectrum is not used by the incumbent which maintains its allocation and assigned rights. Quality of service predictability is linked to the exclusivity and the binary access to a given spectrum resource, at a given location and a given time. Moreover, investments in networks providing predictable Quality of Service require certainty on the predicted availability of spectrum resources
- LSA is a vertical with services and applications provided under the spectrum usage rights of the incumbent and the LSA licensees are and will remain different and thus “vertical”. As such, when a frequency band is made available for mobile broadband ECS under an LSA framework, the incumbent will continue to offer the same services as per its original spectrum usage rights and will not be entitled to offer any public MBB ECS services, while the LSA licensee will be individually authorized to provide mobile broadband ECS services (thus to the public). This is a key feature to avoid market distortions.
- LSA is an enabler of spectrum harmonization as it improves the possibilities of vertical sharing, and in particular of sharing between mobile broadband services and other incumbent uses making available harmonized spectrum for mobile broadband to the market as soon as possible while maintaining important incumbent use where and when it is needed.

Moreover, compared to other sharing mechanisms, LSA provides benefits to both incumbents and LSA licensee:

- The incumbent user benefits from guarantees for its protection as it is expected to be a party in the definition of the sharing framework and the individual license, providing exclusivity among LSA licensees for a specific frequency resource, ensures that the incumbent always has a direct knowledge of the LSA licensee having access to a given frequency resource. This provides incumbent with a good level of certainty for the enforcement of the sharing framework.
- The LSA licensee benefits also from guarantees for its access to spectrum resources as the sharing framework is defined precisely before individual authorizations are granted by the NRA with the prospective LSA licensees expected to be a party to the definition of the sharing framework. Thanks to the individual authorization, the LSA licensee has also an adequate control over the quality of the spectrum resource (no unexpected interference) enabling him to invest in infrastructure leveraging these spectrum resources.



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Furthermore, it is important to point out that sensing is not related in any way to LSA. Sharing under LSA defines precisely who owns access rights to a specific frequency resource at any point in time, in any location. As such, 'sensing', which is only required if the information about who owns spectrum access rights to a specific resource is not available, doesn't have a role to play in LSA.

Supporting innovation through short-term access to shared spectrum

Q15: What are the frequency bands that would be of most value for R&D purposes?

Qualcomm believes that the 2.3GHz and 3.6 – 4.2 GHz bands will be of most interest for R & D purposes in association with LSA concept. This would allow the UK to take a key leading role in Europe and globally to bring this innovation to the market.