26 GHz Spectrum – Ensuring efficiency and maximising benefits

This document sets out some principles, considerations and options that require study in order to establish optimal use of 26 GHz spectrum and maximise the benefits to UK consumers and businesses.

Certainty of Access

It is fundamental that there is certainty of access to 26 GHz spectrum on an un-interfered basis where it is to be deployed over a long period of time, to enable long term investment decisions and deliver high quality services.

Enabling Innovation

To enable innovation and flexible spectrum usage, 26 GHz spectrum needs to be shared sensibly and support a wide range of use cases and business models. Licensees, whether traditional or new users seeking to use the spectrum in innovative ways, should co-exist and not suffer interference, ensuring efficient use of the spectrum.

Understanding Demand

Deployment of 26 GHz spectrum is expected to differ by geography, based upon demand. There will be areas of high demand, typically in urban or dense urban areas with high traffic density. There will also be areas of low demand, typically in suburban areas and elsewhere, which have relatively lower traffic demand. In high demand areas the likelihood of spectrum congestion and interference is higher, so the licence regime should cater for high density deployments and seek to maximise the efficient use of the spectrum in that area, in order to deliver most benefit. Within low demand areas, the likelihood of spectrum congestion will be lower, but the licence regime should enable flexibility of deployment, whilst also providing certainty and protection for existing users.

Establishing a common understanding of what demand areas might look like

The delineation between the two demand areas will be determined by the definition of the minimum traffic density figure used to define 'high' demand. This will be a judgement, as opposed to being a certain absolute value. The 'right' value should reflect the widest possible consensus of stakeholders. Each should have some illustrative examples to see how closely it maps to their aims and expectations. One approach would be to provide a choice, for example two or three, over a reasonable range of geographic outcomes.

Licensing Regimes

Carefully considered licensing design can help to facilitate efficient use of the spectrum and so deliver optimal use for its licence holders and thus maximise benefits to consumers and businesses. The most efficient usage will be achieved where operation is enabled over the entire available bandwidth within the 26 GHz band. The nature of high demand areas means that there are likely to be more than one licence holder. Licence holders require certainty and un-interfered access to their block in the 26 GHz band. However, in addition, remaining available *unused* blocks should also be able to be accessed, otherwise there is an inefficient use of the spectrum. A licensing model that can enable access to a block of spectrum on an un-interfered basis within the high demand areas, whilst

also enabling access to other available blocks that are not in use, will deliver a highly efficient use of the spectrum.

In low demand areas, a licensing model that provides un-interfered access to a block within a defined geographic zone *within* the low demand area, will also enable maximum efficiency. Once a licence holder is established at a location (on a first come first served basis) then they are free to radiate beyond their assigned spectrum if there are no neighbours within the vicinity.

Some useful background references of Ofcom statements are:

https://www.ofcom.org.uk/consultations-and-statements/category-2/5g-access-at-26-ghz

https://www.ofcom.org.uk/__data/assets/pdf_file/0035/157886/shared-access-licence-guidance.pdf

Interference Avoidance Mechanisms

Mechanisms for avoiding interference can include frequency, time and geography. The underlying principle remains the same, in that if spectrum blocks are available to be used within a certain parameter, they can be used. This will ensure a highly efficient use of the spectrum. Spectrum sharing is built on the principle that co-channel users of spectrum (who interfere with each other) should not transmit at the same time within a region where radio signals are able to propagate between them. The licence holder of the spectrum adheres to the principle of spectrum sharing by agreeing to un-interfered access to spectrum within the block that they hold. Likewise, the neighbour, when in the vicinity of the licence holder, agrees to not transmit in the other licence holder's spectrum block. Standardised protocols for interference avoidance should be used where at all possible.

Spectrum could be shared on an un-interfered basis through *frequency* separation. Meaning co-located multiple users of the band could share that spectrum by each transmitting in separate (orthogonal) blocks of spectrum. Spectrum can also be shared through the principle of *physical* separation. Where two users of spectrum are sufficiently separated that they cannot mutually interfere and thus they can share the same spectrum blocks.

Where a user and neighbour are close together they may still share the remaining spectrum that neither party holds. In this case it is possible that they could share the spectrum in *time* (rather than in frequency). Where, for example, there are two users at the same location and both are transmitting continuously, then each user would have rights to access the remaining spectrum for 50% of the time. If there were three users, then each would gain access to the remaining spectrum for 33% of the time, and so on. For two users, where one stops transmitting, then the other is able to transmit 100% of the time in the remaining spectrum blocks. This will ensure maximum spectrum utilisation and efficiency. These spectrum sharing principles would apply equally to both the high demand area and the low demand area.

Study Items

Study items for exploring options to establish the optimal use of the spectrum such as demand, licensing regimes and interference avoidance mechanisms and protocols, are described in the main study document.