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Luminet response to Ofcom consultation:

Enabling mmWave spectrum for new uses

Making the 26GHz and 40GHz bands available for
mobile technology

1 EXECUTIVE SUMMARY

Luminet is pleased to set out below its response to Ofcom's consultation on: Enabling mmWave spectrum for new uses - Making the 26GHz and 40GHz bands available for mobile technology.

Luminet agrees with Ofcom's proposal to address 26GHz and 40GHz bands simultaneously as this allows for more efficient spectrum allocation and also shows the full amount of mmWave spectrum available.

Luminet, however strongly disagrees with Ofcom's proposals to focus entirely on mobile and hotspot use when allocating mmWave spectrum (the proposed height restrictions make the spectrum unusable for fixed wireless access (FWA), broadband FWA (BFWA) and radio local access networks (RLANs). Ofcom's approach ignores the fact that 26GHz is the only currently viable band for gigabit connectivity provision by FWA, BFWA and RLANs. Luminet's analysis shows that spectrum sharing between mobile/hotspots and FWA/BFWA/RLAN is viable and Ofcom has existing provisions in place for 5.8GHz that could be replicated to manage the very limited amount of likely interference.

Even if Ofcom does not accept that spectrum sharing is the best and most efficient approach to mmWave spectrum allocation, there is sufficient spectrum to allocate 400MHz from the shared access low power segment and 400-600MHz from the medium power segment for FWA/BFWA/RLAN usage (with no height restrictions). Allocating no spectrum for those technologies would deprive around 47% of businesses in the City of London and Westminster¹ of the choice of wireless gigabit broadband connectivity.

Given the total amount of spectrum available and the significant uncertainties relating to the benefits that will be derived from mobile and hotspot use of mmWave frequencies, Ofcom's proposed approach seems unduly prejudiced against fixed wireless providers and their customers in favour of mobile and hotspot providers. Luminet considers Ofcom's approach irreconcilable with Ofcom's primary duty to maximise benefits to consumers and citizens.

Luminet strongly urges Ofcom to reconsider its approach and to look carefully at how the relevant spectrum can be distributed equitably between a wider range of providers to deliver substantially greater benefits to consumers and citizens in the UK.

2 INTRODUCTION

Luminet provides London businesses with gigabit connectivity through our unique wireless network, fibre services, and multi-tenant internet, complete with industry-leading 100% service level agreements.

¹ See section 4.6 below.

Our combination of true customer-centricity, strong values, culture and capability in addition to best of breed technology and value for money, makes us the connectivity partner of choice.

Founded in 2005, Luminet was one of the first to offer commercial wireless broadband solutions to businesses and has grown its London client base to over 1,000 businesses.

Luminet uses 5.4/5.8 GHz and 60/70/80GHz spectrum bands for its point to multipoint and point to point BFWA networks respectively to deliver high quality connectivity to businesses across London and is concerned that the proposals set out in this consultation would be to the direct detriment of consumers of fixed wireless access (FWA) connectivity, whether residential or businesses.

We set out in this response why we consider Ofcom's proposals to be flawed and what we consider would be better solutions that would achieve Ofcom's objectives without the detrimental effect on users and providers of fixed wireless connectivity.

3 OFCOM'S PROPOSALS

Ofcom proposes to make a large amount of millimetre wave (mmWave) spectrum available across the 26 GHz and 40 GHz bands for use of mobile technology, including 5G. Ofcom considers that by addressing the use of these frequencies at an early stage of their commercial deployment, it will maximise benefits and reduce disruption to existing users of the relevant frequencies. Where licenses have already been issued in this band, Ofcom proposes to revoke those licenses and replace them with other spectrum, giving a 5-year notice for that revocation.

For the 26GHz band, Ofcom has identified a number of 'high density areas' in which it proposes to:

- assign low power local licences on a first come, first served (FCFS) basis in the lowest 850 MHz of the band, but with an antenna height restriction of 10 meters, using the Shared Access licensing framework; and
- auction city-/town-wide exclusive licences for upper 2.4 GHz of the band with medium power and unrestricted antenna height conditions.

In low density areas Ofcom proposes to assign local licences on a FCFS basis for all of the 26 GHz band, through the Shared Access licensing framework for both low & medium power licenses, still applying the 10m height restriction.

For the 40GHz band, Ofcom proposes to either

- (a) vary existing licences to allow current licensees to deploy mobile services in the band,
- (b) revoke existing licences and re-allocating the spectrum alongside the 26 GHz band, or
- (c) combinations of variation and revocation.

The existing licences have been H3G, MBNL, and MLL, but the licence terms prohibit mobile use.

4 LUMINET'S CONCERNS

4.1 Introduction

Luminet does not object to Ofcom's objective of making mmWave bands available for mobile services. Rather, Luminet believes that this can be achieved without the need for individual licences to be awarded and instead enabling spectrum sharing across a number of different applications and without height restrictions. The height restrictions proposed by Ofcom for the shared access low power in high density area lots and for low and medium power outside high density areas make the spectrum unusable for FWA/BFWA providers. This is the case equally for Luminet providing business connectivity services in London and a rural provider offering Industry 4 connectivity to farms or remote manufacturing sites.

If Ofcom maintains that it considers the risk of interference to be too great, then Luminet proposes that specific frequencies within the 26GHz band are allocated for shared access FWA/BFWA use without antenna height restriction. Luminet's analysis strongly supports that spectrum sharing is the most efficient use of mmWave spectrum and that the risks of interference are low and can be managed through operational practices². It is Luminet's view that Ofcom's proposals are to the direct and significant detriment to FWA/BFWA providers and their customers and that this impact is unnecessary and disproportionate given the very limited likelihood of interference issues arising from shared use and the uncertainty associated with mmWave deployment in mobile networks.

Ofcom states that the commercial potential for mmWave is evolving and uncertain³. It is Luminet's view that it is premature and disproportionate to make mmWave frequencies available to mobile operators and hotspot providers only, while the commercial benefits that can be derived by other forms of mmWave use – such as FWA/BFWA/RLANs – are significant and would be significantly limited if Ofcom's proposals were to be implemented.

Ofcom's discussion of new uses and future benefits appear to focus entirely on the use by MNOs and does not explore any new uses and future benefits from other parts of the sector including FWA. Such new uses include the provision of gigabit connectivity on FWA/BFWA.

4.2 Luminet's proposals

Luminet proposes that Ofcom should refrain from auctioning spectrum in the mmWave bands at this time. We consider this to be unnecessary and wasteful of spectrum that could be used simultaneously by MNOs/hotspot providers and FWA/BFWA/RLAN providers. This is because MNOs and their hotspot mobile densification use would be primarily at street level and business

² See Annex 1.

³ Paragraph 2.6 – 2.7 and 2.38.

FWA/BFWA provision would be at roof-top level and the nature of mmWave frequencies is such that the level of interference would be minimal⁴.

Ofcom could also consider shared use provisions which for mobile and hotspot provision was subject to a height restriction (maximum height) whereas FWA/BFWA providers would be subject to a minimum height restriction. This could have the potential to further reduce the risk of interference.

Ofcom's existing framework for coordination via its licensing database for 5.8GHz is an example of how any interference could be managed. Luminet recommends that Ofcom actively investigate to deploy a similar model for the 26GHz band.

In the event that MNOs or hotspot providers need to use mmWave spectrum at heights that would cause interference with the FWA use, then it may be possible to reserve small frequency slots for that purpose, whilst leaving the vast majority of the mmWave spectrum open to shared use by all providers within specified parameters.

If Ofcom will not accept the strong case for shared access across both low and medium power levels, then Luminet proposes that Ofcom make available 400MHz from the shared access low power segment use and 400-600MHz from the medium power segment for FWA/BFWA/RLAN usage, both with no height restrictions. There is sufficient remaining spectrum in the 26GHz and 40GHz bands to enable mobile and hotspot deployments and Ofcom would thus be enabling much greater variety of use cases and benefits to be derived from the deployment of mmWave spectrum.

4.3 Ofcom's rationale

We understand that Ofcom's rationale for the proposals set out in this consultation is to ensure certainty to enable new and future uses of mmWave bands by mobile network operators (MNOs). Ofcom cites recent developments in international standards and equipment design as indicators that mmWave will become important to MNOs for very high-speed services.

Ofcom, however, does not explain why it considers it necessary to issue exclusive licences for the mmWave bands in question. Ofcom does not present evidence (other than the ECC 303 report on interference between 5G and fixed links, which is inconclusive) that the relevant spectrum bands cannot be shared between MNOs and FWA/BFWA providers, for example. It would seem that Ofcom simply assumes that exclusive access to specified frequency in the mmWave bands is the most appropriate approach.

Ofcom's stated objectives for enabling new mmWave uses are:

- a) Achieve efficient allocation of spectrum
- b) Sustain strong competition in mobile markets
- c) Encourage investment and innovation in new uses

⁴ See Annex 1.

d) Ensure timely availability of spectrums

Luminet agrees with those objectives with the exception that objective b) should not be limited to 'mobile markets'. There appears to be no reason why Ofcom's objectives should be limited to mobile services and markets, when mmWave spectrum is suited for innovation in other segments of the wider telecoms market as well. If Ofcom were to modify objective b) to read "Sustain strong competition", then it would follow naturally that it should look at benefits that could be derived from the use of mmWave spectrum by mobile and fixed technologies and services alike.

Ofcom's primary duty is to further the interests of citizens and consumers. By adopting the very narrow focus presented in this consultation, Luminet considers that Ofcom is not acting in accordance with that duty. The uncertainty of benefits to be derived from mobile use of mmWave and the already established use of mmWave spectrum for high-speed and high quality FWA connection to businesses both need to be considered. It is Luminet's view that Ofcom has failed to do so when developing the proposals presented in this consultation.

We note that Ofcom considers whether possible competition concerns may arise from its proposals⁵ and concludes that no competition concerns arise:

"In the case of Fixed Wireless Access, this is because connectivity could be provided using other mmWave spectrum bands²¹⁰ and fixed broadband – the main substitute – is widely available in the UK. We therefore consider that the proposed auction is unlikely to have a notable impact on competition for Fixed Wireless Access in high density areas. We have also focused our assessment on spectrum awarded in high density areas on the basis that we have proposed to award spectrum by auction only in these areas. (²¹⁰Such as the 28 GHz, 32 GHz and 57-71 GHz bands.)"⁶

Luminet disagrees with that assessment. Ofcom refers to 28GHz spectrum for FWA, but that spectrum is not available for shared access and therefore is not viable for FWA provision. 32GHz is used for Point-to-Point connections, and the costing structure is not compatible with FWA provision, or it is auctioned, again not suitable for FWA. And, finally, the very short reach of 51-57GHz makes it unsuitable for FWA/BFWA wide area applications.

It is Luminet's position that only 26GHz is currently viable for point-to-multipoint gigabit connectivity provision. Therefore, designing a spectrum allocation system for 26GHz that effectively & technically excludes FWA access is very detrimental for FWA/BFWA/RLANs providers and their customers.

4.4 Use cases, demand, and deployment strategies for mmWave

Luminet considers that Ofcom's view of new uses and benefits that can be derived from making mmWave frequencies available is too narrow and focuses unduly on mobile uses and benefits.

⁵ Paragraph 11.4

⁶ Paragraph 11.14.

Luminet does not dispute that there can be significant benefits and new use cases from mobile/5G use of mmWave, but the benefits to customers using high-speed and high quality FWA services would also be substantial, including the availability of Gigabit speeds with extremely high reliability and associated SLAs. These benefits should not be ignored. Many businesses in London today benefit from the high quality FWA connectivity offered by Luminet and the further enhancement of those services that would be possible with the use of mmWave spectrum need to be included in Ofcom's analysis.

Luminet's fixed wireless services to businesses offer very high availability, low latency and symmetrical bandwidth to business users. The service can be provided quickly and can be for long-term or short-term interim use. The benefits derived from this flexible high-speed and high-quality connectivity are substantial and yet they appear to have been completely omitted from Ofcom's considerations.

4.5 Ofcom's proposed approach to mmWave spectrum

Luminet agrees with Ofcom that it should address 26GHz and 40GHz spectrum together as this makes it clear that there is a significant amount of spectrum available, and it makes it possible to offer contiguous frequency blocks for more efficient use by licensees.

Luminet, however, fundamentally disagrees with Ofcom's proposal to reserve all the 26GHz and 40GHz spectrum bands for mobile use only. As set out more fully above, it is Luminet's view that Ofcom should either enable shared use of all the spectrum (without height restrictions or with separate height restrictions for different uses) or reserve a part of the spectrum in the 26GHz band for FWA/BFWA/RLAN use.

4.6 Ofcom's proposed approach to authorisation

Ofcom proposes shared access FCFS for all mmWave spectrum in low density areas. Whereas in high density areas, Ofcom proposed shared access for the bottom 850MHz of the 26GHz band and to auction the rest of the 26GHz band. Ofcom further proposes to adopt a similar approach in the 40GHz band, if it proceeds with the reallocation of that band.

Luminet operates in London, so our primary concerns relate to Ofcom's proposals for high density areas. Access to mmWave frequencies (in both low and medium power bands) is important for FWA providers of high-quality connectivity services to an increasingly quality-conscious customer segment. Luminet offers strict service level agreements (SLAs) and service level guarantees (SLGs) to its customers. The ability to use mmWave frequencies would improve both speed and quality of the service we can offer. Many of our business customers in London do not have access to fibre connectivity and would suffer if FWA providers were denied to possibility to increase speed and quality of their connections, because all mmWave frequencies were reserved for MNOs. We note that in its Connected Nations report update Summer 2021 (<https://www.ofcom.org.uk/research-and-data/multi-sector-research/infrastructure-research/connected-nations-update-summer-2021/interactive-report>) The data shows that only 52%/53% premises in the City of London and

Westminster have access to ultrafast broadband services. Luminet's high-speed FWA service currently provides 200Mbps connectivity to businesses in those areas and access to mmWave spectrum would enable Luminet to increase its offering to offer 1Gbps connections to service businesses across London.

4.7 Ofcom's approach to identifying high- and low-density areas

Luminet agrees with Ofcom's proposed approach to identifying high- and low-density areas.

4.8 Coexistence with existing uses

Luminet considers it correct that Ofcom attempt to clean up the respective spectrum bands in order to enable the allocation of contiguous unencumbered frequency packages, which will allow for more efficient spectrum usage by the relevant licensees.

Luminet, however, disagrees with Ofcom's presumption that all the cleaned-up spectrum should be reserved for mobile and hotspot use. Allocating all mmWave frequencies for mobile and hotspot use is disproportionate to the likely benefits that could arise from that use (Ofcom acknowledges that benefits of mmWave use for mobile remains very uncertain at this time), especially as the benefits that can be derived from the use of parts of the mmWave spectrum by FWA providers would be substantial and immediate.

4.9 Auction design

As set out above, Luminet disagrees with Ofcom's plans to auction mmWave spectrum in high density areas. This is because that would effectively reserve that spectrum for mobile and hotspot use (due to the height restriction), preventing FWA providers from using that spectrum despite there being little or no risk of interference.

If Ofcom proceeds with the proposed auction, then we present our views on the auction design below:

- Luminet agrees that a 2-stage auction would be appropriate, including the proposed purpose and scope of the principal and assignment stages of the design.
- Luminet agrees that it would be appropriate that spectrum should be auctioned separately for individual high density areas. Luminet operates in London only and would not wish access to spectrum in other high density areas. Allocating access across all high density areas would lead to inefficiencies.
- With regards to lot design, Luminet proposes that Ofcom reserves lots for FWA/BFWA/RLAN use and that these are made available for shared use managed in a similar manner as that used presently for 5.4/5.8GHz spectrum. BFWA/FWA would require 400MHz on the low power band and 400-600MHz in the medium power band, both without height restrictions. Luminet has no preference for how spectrum lots for mobile and hotspots are designed.

- Luminet would advocate a short licence period. This is because the benefits of mmWave in mobile are too uncertain for it to be appropriate to tie up significant spectrum packages for a long period. Luminet would advocate a 10-year licence period with the option to renew if benefits have been proven after 8 or 9 years.

ANNEX 1

Luminet Study:

For illustration purposes, Luminet has done on-net LOS (line of sight) analysis from multiple high roof tops from 70-200m above the ground level for approx. 64sqkm coverage in London. This has been done by using our proprietary RF planning tool and 3D building & terrain data with 1m resolution (provided by Seradel). *Further details and data can be provided on request)*

Based on this analysis study the average building roof height in London is 14 to 15m. which is far above 10m height restriction of the hotspot model.

In Figure 1, red indicates no line of site, green indicates line of sight, and light blue & yellow indicate obstructed line of sight.

Our analysis clearly shows that there almost is no line of sight from buildings to street level areas and walls. We therefore conclude that high site radio sectors will not be able see hotspot sectors and interference resulting from mobile/hotspot deployment under 10m height and FWA deployment should consequently be negligible.

