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# **Representing:**

Organisation

# **Organisation (if applicable):**

Aviat Networks

## **Additional comments:**

# Question 1: What are likely to be the key underlying factors influencing changes in demand for this spectrum (in terms of quantity of spectrum or preferred bands) over the next 5 to 10 years? Please provide band specific evidence to support your view.:

Aviat Networks believes that the next 5-10 years will see a marked increased in the usage of the millimeter wave bands especially for support of urban small cell, high capacity backhaul. In light of this expansion we believe a key factor is the retention of the current light licensing scheme for the 70/80 GHz bands

We also believe that the growth in data traffic as LTE networks are deployed will drive an increasing demand for greater backhaul capacity. In order to meet this increased demand we believe that the availability of larger channel widths is key. This could be either of the form of single 56MHz channels or by allowing aggregation of two or more channels, e.g.  $2 \times 28$ MHz or  $2 \times 56$ MHz to make larger channels.

One concern that we do have is that the use of block allocation can freeze out new entrants and cause congestion in other bands. Our concern here is that once a band or part of a band is allocated to a single user, all other users are barred from that spectrum. Furthermore the amount of spectrum allocated under this process may turn out to be more than that user requires thus resulting in under-utilized spectrum in some bands whilst causing congestion in others. On the other hand link by link licensing is demand driven and allows for a more flexible approach to spectrum usage.

Spectrum pricing will also have an impact as the current pricing mechanisms discourage high bandwidths, which is where the demand is heading. To this end in those bands that are licensed link by link a cap on the bandwidth element should be considered, possibly at 28MHz, so as to encourage use of high capacity usage.

Clean bands in terms of bands being uniquely allocated to the fixed point to point service also

make usage more attractive as deployment roll-out is easier when coordination issues are restricted to like services, e.g. no MOD concerns.

# Question 2: Will the reducing trend in the numbers of fixed links in the spectrum under review to support mobile backhaul continue? If so, in which bands will this reduction be most apparent and how will link capacity/bandwidth requirements change? What factors will have the biggest influence on the outcome? In your view, what will be the impact, on spectrum demand, of deploying next generation mobile networks for example using Long Term Evolution (LTE) standards? :

Aviat Networks is not totally convinced that the overall number of links is in fact decreasing and would point to the recently published ECC Report 173 as evidence, but whatever the numbers are saying we believe that the overall capacity being used to support mobile backhaul is growing.

We believe that in order to successfully support the user demand foreseen as a result of LTE deployment the availability of larger channels and the possibility of channel aggregation are key to being able to backhaul the amount of traffic foreseen without causing network bottlenecks. In densely populated urban areas the use of high capacity short range links in the millimeter wave bands (e.g. above 50GHz) is ideally suited to this application. These high frequency bands also have the advantage that frequency re-use is better than in the lower frequency bands.

Another factor impacting the use of microwave technology for backhaul is the change in the price break point between fibre deployment and microwave deployment.

However possibly the biggest factor is the cost of licenses for high bandwidth links. As in our response to question one, a price cap on the bandwidth factor should be the minimum considered to encourage use of microwave to satisfy capacity demands.

Question 3: How might the changes to current or future public safety networks influence the existing and future requirement of the spectrum under review for fixed link backhaul for public safety applications over the next 5-10 years? In which spectrum bands is demand most likely to arise and how much spectrum would be required? May demand for bands currently used by public safety applications decrease? Is it likely that the public safety services may require access to the spectrum under review for other data networks or for alternative uses?:

Aviat Networks does foresee any significant change in the demand from public safety/public utility sector for microwave spectrum.

Question 4: How likely is it that use of CCTV by local authorities will significantly increase overall demand for fixed link infrastructure spectrum over the next 5 to 10 years? If so, in which bands is the additional demand most likely to be required and why? Do you have any information about the relative costs of wired and wireless CCTV links in urban and rural areas?:

Aviat Networks does not believe this application will grow into a significant market across the microwave sector. Many of these links are realized by using the light licensed 5.8GHz band, as cost is a major factor on local authority spending.

Question 5a: What are the main factors (technical or regulatory) that determine preferences for one band over another for satellite applications? Do these factors vary between different types of satellite applications (Mobile, Fixed, Broadcasting and Science services)? In which bands will we see the most significant changes in demand in the next 5 to 10 years, and why?:

Aviat Networks currently has no comments related to this question.

Question 5b: A number of the frequency bands under review are currently used for satellite Permanent Earth Stations (PESs), for example to feed Direct to Home satellite broadcast services. What are the continued and future spectrum requirements for satellite PESs (E-s & s-E) likely to be and in which bands? Please provide evidence to support your views.:

Aviat Networks currently has no comments related to this question.

Question 5c: During recent years, some commentators have forecast significant demand for spectrum to support satellite consumer terminals. To date this demand has been slow to materialise. Do you have information which would help inform a more accurate assessment of future demand for spectrum in bands currently shared with fixed links?:

Aviat Networks currently has no comments related to this question.

Question 5d: Are there factors specific to the satellite based communications sector which mean that it faces particular difficulties evidencing and satisfying demand for spectrum? If so, how might these be overcome?:

Aviat Networks currently has no comments related to this question.

# Question 6: What is the likely timetable for rollout of Smart Grids and what impact will these developments have on demand for spectrum in the bands covered by this review?:

Aviat Networks believes Smart Grids are beginning to be rolled out but these are expected to be relatively small scale at present. We further believe that large scale deployment would be beyond the 5 year timescale being referred to in this consultation. Furthermore we believe that initial support for this application would be provided by using existing network infrastructure.

# Question 7: What impact will DAB expansion have on demand for the spectrum under review? Are there any other demand drivers that Ofcom

# should consider in relation to broadcasting use or services related to broadcasting? :

Aviat Networks currently has no comments related to this question.

Question 8a: What is the likely demand for broadband wireless access applications in the spectrum under review and which bands is this likely to specifically impact? How should Ofcom consider the demand for backhaul to support such applications and is such backhaul demand likely to arise in the spectrum under review?:

Aviat Networks believe that LTE will be the technology provider for broadband wireless applications in both urban and rural environments. Of the bands under review in this consultation we believe that the 4GHz band is most likely candidate, although the 800MHz digital dividend band and the 450MHz band would also be attractive for LTE access deployment.

Question 8b: Do you consider that the emergence of rural broadband fixed wireless access will influence overall demand for the spectrum under review and to what extent? Which bands is this likely to impact most?:

see 8(a)

Question 9: Do you consider that there will be a material additional demand from the PMSE community for access to the spectrum under review? Which bands under review is this likely to impact most and to what extent?:

Aviat Networks currently has no comments related to this question.

Question 10: How might the economics of new fibre provision (with or without reliance on regulatory remedies ? whether active or passive), as compared with wireless provision of both terrestrial and satellite based services, impact on the requirements for wireless backhaul? We are interested in the possible impact, in terms of the extent of possible substitution for wireless links and in terms of the nature of wireless links affected (urban v. rural, lower / higher frequency bands).:

Aviat Networks believes that in comparison to "new fibre provision" microwave offers significant cost advantages in terms of cost of deployment and return on investment. Whilst equipment costs in both the microwave and fibre sectors have reduced considerably over the past 5 years or see, we do not believe the same in terms of installation costs, especially for new fibre. In addition the cost of the labour intensive issues surrounding the laying of new fibre routes has risen considerably.

Given the above we believe that an urban environment is best suited to backhaul demand being served by high capacity, high frequency (over 50GHz) microwave. These radios can be matched with flat panel antennas, which have a lower visual impact on the skyline, building corners, street furniture deployment than traditional parabolic antennas, thus providing a solution without the need for large unsightly radio towers.

Ongoing operating costs such as annual license fees are a major expenditure that disadvantages microwave in comparison to fibre. These licenses costs rise considerable with the increasing bandwidth that is needed to compete with fibre capacity. As previously mentioned one solution would be to cap the bandwidth element of the license fee calculation.

## Question 11: What issues relating to spectrum access for different services do you think Ofcom should review? How might Ofcom start to rely more on commercial decisions when determining allocations of spectrum in the bands covered by this review?:

As mentioned in our answer to question one Aviat Networks has reservations regarding the use of block licensing/allocation for microwave spectrum.

We also believe that where light licensing isn't being used a charging structure based on efficient spectrum usage i.e. to encourage the use of higher order modulation scheme and bandwidths to deliver higher capacity. Furthermore we also believe that charging could be adjusted to encourage a more balanced use of the various bands to relieve congestion by spreading the load across more bands. Again this may not be possible if too many bands are taken out of the picture by the use of block allocation.

## Question 12: We would welcome views on the potential for more widespread use of market based approaches to the spectrum under review such as third party band management, and the regulatory steps which would need to be taken to facilitate this. :

Aviat Networks believes that the only step forward in this area would be a pan-European consolidated approach to band management run by a third party. Other than that we see no benefit in a country specific third party management arrangement and many potential problems in terms of delays etc in one were introduced in comparison with the current arrangements.

# Question 13a: do you consider that any changes should be made to the Ofcom licence fixed link product set?:

As previously stated Aviat Networks believes that the use of block licensing is not appropriate for the point to point microwave bands.

# Question 13b: Might a more flexible approach to licensing, in bands where demand is unlikely to exceed supply for the foreseeable future, enable more intensive use of these bands? If so, what form might the licensing take and in which bands would this be appropriate? :

Aviat Networks believes that the current license exempt bands do not provide sufficient protection for users wishing to exploit them for carrier grade applications such as mobile backhaul and as such these bands should be transferred as a minimum to the light licensed approach. The exception here would be the 5.8GHz band which is a popular home for non-carrier grade services and should continue to be so, as this approach aligns with similar approaches in other countries.

There also could be some benefit in charging a slightly higher fee in the light licensing bands for initial registration in return for Ofcom reviewing the coordination aspects of new links. Again carrier grade applications require a degree of certainty that is provided by the traditional link-by-link approach that is missing from the current light licensing approach and this may be deterring use of these bands for these applications.

A more radical approach would be to treat each link by link allocation as though it were a mini block allocation and simply allow anything that fits the applicable spectrum mask to operate in that channel with no restriction on modulation and data throughput

## Question 13c: Are there other actions which Ofcom could take to improve spectrum efficiency by encouraging migration to or use of higher, less heavily used, bands, with a view to freeing up spectrum in popular lower frequency bands? :

Aviat Networks believes that a key factor is cost of deployment in these new bands. The higher frequency bands generally exhibit a better frequency re-use than the lower bands and less susceptibility to mutual interference than the lower bands owing to the different propagation conditions present. With this is mind the antenna technical requirement could be sufficiently relaxed to encourage the take up of flat panel antennas. Flat panel antennas have the advantage that they are visually less obtrusive, which is an important factor as the applications foreseen in these higher bands will require equipment to be mounted in an urban environment and away from the traditional tower locations. Therefore we believe that the use of flat panel antennas should be encouraged for the bands above 28GHz.

# Question 14: What is your view on the impact of geographically uniform fees for spectrum bands included in this review? If you consider that a geographic fee modifier would promote more efficient use of spectrum, how might that modifier be constructed?:

Aviat Network does not see any advantage in having a geographic based modifier in the fee calculation as the driver is the amount of traffic that is expected to be transported is the major factor in deciding whether a link is viable or not.

As a general rule Aviat Networks does not see a major advantage in having geographic modifiers in fee calculations. However, we recognize that high licence fees do have a negative impact on deployment in areas where traffic is low, e.g. backhaul for rural broadband, and this could be a barrier in achieving the government desired aim of delivered high speed broadband to all of the U.K. population. The complication here is the definition of rural and applying the geographic modifier in a way that is consistent but also encourages the use of fixed microwave to serve otherwise disconnected communities.

# Question 15: Are there other aspects of the review on which you have evidence that would help inform our consideration of these issues and formulate proposals for consultation?:

Aviat Networks believes that by using the technical parameters and values form the current ETSI standards for link design is questionable as in certain cases this promotes the use of higher output power than required with current receiver design. We accept that the solution here is probably to change the ETSI standards, but felt it is a point that should be raised in answers to this consultation.

# Question 16: Is the proposed list of bands to be included within the review (as set out in Figure A.5.1 in Annex 5 appropriate?:

Aviat Networks believe the list is appropriate for this review.