Representing:

Organisation

Organisation (if applicable):

David Hall Systems Ltd

What additional details do you want to keep confidential?:

No

If you want part of your response kept confidential, which parts?:

Ofcom may publish a response summary:

Yes

I confirm that I have read the declaration:

Yes

Additional comments:

Question 1:How is demand for indoor wireless data connection speeds and capacity likely to develop over the next 5?10 years?:

We expect that consumers will demand data rates similar to those provided via fixed broadband. More significantly we expect that there will be a major increase in the capacity required together with better in-building coverage. The combination of these trends will result in wider channel bandwidths being required within the next 5 years.

Question 2:How is demand for indoor wireless data connection speeds and capacity likely to develop over the next 5?10 years?:

There is a complex spectrum usage pattern for the 5 GHz band and it may be difficult to increase the proportion allocated for WiFi usage. However we consider that efforts should be made to increase the amount of spectrum available so as to meet the growing demand for indoor connectivity. This will require the development of additional sharing scenarios to allow maximum usage of the 5 GHz band. Unfortunately it is unlikely that this additional spectrum can be made available within 5 years which is our expected timeline.

Question 3:Are there other types of indoor wireless applications will require access to alternative spectrum other than that provided by the licence exempt 2.4 and 5 GHz bands used by Wi-Fi?:

We consider that the consultation has identified the most likely other types of applications and we take the view that sensor connectivity is the most important other application.

Question 4:What role do you think Wi-Fi will play in providing wireless broadband connectivity outdoors over the coming 5-10 years?:

On the basis that improvements can be made so that users find it easy to obtain access to the networks we consider that there will be significant demand for outdoor WiFi and it will play an important role in providing mobile broadband and wireless data connectivity. In view of the high demand for 5 GHz spectrum we consider that this band should not be used for back haul purposes.

Question 5:Will the increased deployment of Wi-Fi access points outdoors create a risk of reduced quality of service performance over the longer term and, if so, will approaches to co-ordinate access point performance be able to mitigate this risk?:

We consider that there is a potential risk of reduced quality of service. However improvements in radio access technology can play a role in addressing this risk though we consider that additional technological improvements may be required to address all the issues. There is a need for research into building intelligence into the access points so that a more coordinated network develops from the various uncoordinated systems. Additionally the regulatory and policy frameworks need to evolve to allow for a number of separate networks to work together as one virtual coordinated network.

Question 6:Will improved approaches to accessing spectrum in licence exempt bands be needed in the longer term to maintain the quality of service achievable for outdoor public mobile broadband and/or M2M services? If so, which approaches are most likely to be adopted and how likely do you think they are to be successful in improving access to spectrum?:

We consider that the rules for using licence exempt spectrum are likely to require review to take into account the changing licence-exempt usage environment with a need to focus on access rights. Additionally technology developments should be considered and these should focus on improved receiver sensitivity and selection of the required signal so as to improve shared access to spectrum.

Question 7: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?:

We consider that a process should be developed for identifying appropriate frequency bands rather than identifying specific frequency bands and we consider that this approach of developing a process allows for the most flexibility for spectrum usage. The process could be based on identifying licensed spectrum that is not fully utilized in bands suitable for mobile broadband and wireless data. The spectrum identified using this process should then be examined to determine if sharing is feasible. Where sharing is deemed feasible then the appropriate steps should be taken to make the spectrum available.

Question 8: Would access to these bands best be realised through licensing or licence exemption?:

As the primary user of the frequency bands will be licensed we consider that there may be difficulties in having full licenses for a non-primary general user of the band. It may be possible to develop procedures to allow such licensing and this has been done for non-primary specific applications such as PMSE. However our preference for non-primary general applications is licence-exempt use though it might be necessary to introduce light licensing to ensure that all the sharing conditions are fully complied with.

Question 9: Do you believe that tiered shared access to a range of spectrum bands has a role in meeting demand for mobile and wireless data and, if so, which applications and devices do you think will be particularly suited to this access model?:

We consider that tiered shared access will have a significant role to play in meeting future spectrum demand for mobile and wireless data services and applications. As the technology and procedures develops for allowing shared access the range of applications and devices should increase, possibly in innovative ways, making it difficult to refer to specific applications and devices at this stage.

Question 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?:

We consider that DSA will have a significant role to play in meeting future spectrum demand. In order that various issues associated with the introduction of DSA can be addressed in a timely manner we consider that a timeline should be attached to the Roadmap shown in Figure 14 of the consultation document. We recognize that there will be difficulties in developing such a timeline and at this stage it might be indicative only. Also it might be appropriate to identify the key issues that need to be addressed for each stage in the roadmap though we recognize that the issues are likely to evolve over time.

Question 11: What barriers still remain to the realisation of cost-effective sensing appropriate for low-cost consumer devices and what activities are ongoing to try to address them?:

There are a number of barriers to be addressed and more resources should be directed into the ongoing research related to these issues. We consider that the priority areas should be to address the issues associated with 'White Space Devices +' and a future work programme should be developed for addressing the issues associated with 'Device Scanning'

Question 12: Over what timescales could DSA become a mass market proposition?:

We consider that a short time scale, of say 5 years, would be appropriate but this may be difficult to achieve in view of the range of issues that need to be addressed. A clearer

indication of what is achievable will be obtained when a timeline is applied to the roadmap shown in Figure 14 of the consultation document.

Question 13: What role should Ofcom play, if any, to support the development of DSA and relevant technologies?:

Ofcom should play a catalytic role in supporting R & D into the technology required and play an active role in developing the regulatory and policy framework to support DSA.

Question 14: Do you have any other views on any of the issues discussed in this consultation?:

Innovative approaches are required to encourage improved spectrum usage efficiency and increased sharing of spectrum between different services and applications. Ofcom should create an environment where these innovative approaches can be developed and encourage R & D to develop these innovative approaches.

Question 15: What are the frequency bands that would be of most value for R&D purposes?:

The frequency bands with the most value should be those that are expected to be used for the next generation of mobile broadband and wireless data. However to allow for innovative developments it may be appropriate to include a wider range of frequency bands. An approach would be to identify the high value bands and state that other bands are available without specifying them to allow for innovative developments.

Question 16: What are the potential benefits of using a geolocation database approach for short-term access to spectrum for R&D and how would you see this working from a practical perspective? Are there alternative approaches that could deliver similar benefits?:

A key benefit would be to reduce the complexity of obtaining access to spectrum for R & D purposes. As geolocation databases are being developed for other purposes we question if there is any need to identify alternative approaches for R & D requirements. Indeed developing a multi-purpose geolocation database might have benefits that would not result from developing a single purpose database though currently it might be difficult to identify these benefits.

Question 17: What characteristics do you view as important to researchers in arrangements to facilitate temporary access to spectrum for research and development purposes?:

The key characteristics are simple procedures for obtaining access to spectrum and the minimum conditions related to spectrum usage. Another key factor is having ready access to spectrum when required rather than having to wait before obtaining access.