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## **Hyperband Wireless**

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**Keywords:** *wireless communications, multi-user communications, ultra-wideband, signal processing*

**Key skills:** *computer systems engineering; electronics; physics; telecommunications*

### **Background**

In recent years Ultra-wideband (UWB) wireless has received a great deal of research and commercial investment [1]. This wireless technology uses very wide bandwidths to transmit data rates of around 500Mb/s over ranges of up to around 10m. The system is specified by spectrum regulators and commercial standards such as WiMedia [2]. Building on the principals of UWB, hyperband wireless is a novel and exciting concept exploring the potential of extending operating bandwidths beyond those of UWB [3]. The potential advantages of such a system are: unprecedented data rates, energy and spectrum efficiency. Research at Oxford University is currently exploring the feasibility of this concept with a focus on examining the fundamental aspects such as signal propagation and waveform design. The objective of research proposed here is to compliment the work at Oxford University through addressing ways of managing interference from other spectrum users. This PhD will have collaborative aspects with the Oxford University.

### **Programme**

The aim of this PhD is to build on the Hyperband Wireless concept by investigating and developing innovative means of managing interference from other spectrum users. This compliments work being conducted at Oxford University. The research will be a blend of theory, computer simulation and experimentation and has the following milestones:

- i. report of prior art (6 months)
- ii. Analyse and quantifying interference in Hyperband Wireless (12 months)
- iii. Investigate candidate techniques for interference mitigation (12 months)
- iv. Write and submit year 1 report (12 months)
- v. develop a simulation platform enabling the performance of candidate techniques to be ascertained
- vi. Write and submit years 2 report
- vii. Develop an experimental system enabling practical evaluation of chosen techniques
- viii. Write and submit thesis (36 months)

### **Impact potential**

The researcher is encouraged to publish in leading academic journals. Examples relevant to this programme of study are: IEEE Trans. Wireless Communications, IET Communications, IEEE Trans. Communications, IEEE Journals on Selected Areas of Communications

### **References**

- [1] B Allen (Editor), "Ultra Wideband: Technology and Future Perspectives", White Paper WWRF
- [2] G Heidari, "WiMedia UWB", Wiley, 2008

[3] V Sipal, B Allen, D Edwards, "Exploration and Analysis of Fade Depth Scaling", Loughborough Antennas and Propagation Conference, 2010

