

## **Electromagnetic Engineering for Communications in the Built Environment**

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The ability to communicate wirelessly within buildings - both reliably and with acceptable performance - is becoming increasingly important, as the range of consumer-grade portable devices with broadband wireless functionality proliferates. Although these devices provide amazing functionality, much of this is dependent on being able to achieve broadband internet connectivity which, from a user perspective, is frequently sub-optimal. It can be argued that levels of dissatisfaction have increased as a result of inevitable comparisons with broadband wired systems - the performance of which is taken for granted by many users at present. For wireless systems, the shared nature of the channel and the ability to compensate (where necessary) for the vagaries of radio propagation within buildings is crucial for achieving adequate performance. This situation is further compounded in that buildings are often internally reconfigured during their lifetimes, and details of their construction are frequently only known to limited accuracy.

In this presentation two key aspects relating to the electromagnetic engineering of these systems will be considered. Firstly, the mechanisms by which radio signals propagate in typical built environments will be discussed, using results from a comprehensive study of propagation in a typical multi-storey building using the FDTD method. Secondly, the influence of these propagation effects on the reliability and capacity of wireless systems from a user perspective will be considered. Strategies for how wireless communication systems engineers might best address these challenges will then be proposed.



### **Biography - Michael J. Neve**

Michael Neve was born in Auckland, New Zealand on October 29, 1966. He received the BE(Hons) and the PhD degrees from the University of Auckland in 1988 and 1993 respectively.

From May 1993 to May 1994, he was Leverhulme Visiting Fellow at the University of Birmingham, UK. During this time, he was involved with radiowave propagation research using scaled environmental models. From May 1994 to May 1996 he was a New Zealand Science and Technology Post-Doctoral Fellow within the Department of Electrical and Electronic Engineering at the University of Auckland. From May 1996 to December 2000 he was a part-time Lecturer/Senior Research Engineer in the Department of Electrical and Electronic Engineering at the University of Auckland. In 2004 he was a Visiting Scientist at

the CSIRO ICT Centre in Sydney, Australia and is presently a Senior Lecturer in the Department of Electrical and Computer Engineering at The University of Auckland.

His present research interests include radiowave propagation modelling in cellular/microcellular/indoor environments, the interaction of electromagnetic fields with building structures, cellular system performance optimization and antennas. He was jointly awarded a 1992/93 IEE Electronics Letters Premium for two publications resulting from his doctoral research.