

Weather, waves and wireless: Super strength signalling

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A new study from the University of Leicester has discovered a particular window of time when mobile signals and radio waves are ‘super strength’ – allowing them to be clearer and travel greater distances, potentially interfering with other systems.

The research, examining the signal strength of radio waves travelling over the sea, identified late afternoons and early evenings in spring and summer as a time when enhanced signals occur.

The research by Salil Gunashekar was part of his Doctoral studies at the University of Leicester’s Department of Engineering and has yielded results that have implications for the design of cellular telephone networks operating in marine and coastal regions

Dr Gunashekar, who is now a Post-Doctoral Research Associate in the Radio Systems Research Group, said: “In today's world, radio waves are an indispensable means of communicating information 'without wires' from one place to another, be it for radio broadcasts or cell phones, television transmissions or airport radars.

“When radio waves travel for long distances over the sea their strength can be affected by the weather. The constantly changing weather conditions over the sea mean that marine and coastal environments, in particular, are prone to unusual atmospheric phenomena that enable radio waves to travel longer distances and have higher strengths than expected.”

On Wednesday 4th June, in the fourth of the series of Doctoral Inaugural Lectures, Dr Gunashekar will present the key findings of his Ph.D. research in which he conducted a detailed theoretical and experimental investigation of the propagation characteristics of over-sea radio communications.

Specifically, between August 2003 and August 2005, three long-range radio paths operating at a frequency in the ultra high frequency band (UHF: specifically 2 Gigahertz) were established in the British Channel Islands. This frequency is of particular importance since it is used by many mobile phones. The relationship between specific over-sea propagation mechanisms and signal strength distribution patterns in a temperate region such as the English Channel have been examined, modelled and correlated with meteorological parameters.

Dr Gunashekar said: “Interestingly, signal strength enhancements have been observed on all three radio paths, predominantly in the late afternoon and evening periods, in the spring and summer months. During these periods, which occur only approximately 5-10% of the time, the influence of higher-altitude radio wave ‘trapping’ structures has been verified.”

The research conducted in this investigation is expected to have implications for the design of cellular telephone networks operating in marine and coastal regions, as well as other maritime communication systems such as those used in commercial shipping and sea-rescue operations, and is all the more applicable to the United Kingdom because of its extensive coastline.

Source: University of Leicester

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