No dark side to using LED lights to supplement WiFi, research reveals

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Energy-saving Light Emitting Diodes (LEDs) could help meet demand for wireless communications without affecting the quality of light or environmental benefits they deliver, new research funded by the Engineering and Physical Sciences Research Council (EPSRC) has shown.

A University of Edinburgh team has found that transmitting digital data via LEDs at the same time as using them to generate light does not make the light dimmer or change its colour. Nor does it make the LED more energy-hungry. Dr Wasiu Popoola of the University of Edinburgh, who led the research, says these concerns have held back the more widespread adoption of Light Fidelity, or LiFi, which uses household LEDs to enable data transfer.

But these findings help eliminate key hurdles to using LEDs to help satisfy the increasing global thirst for wireless communications. Preserving the quality of lighting is, in particular, a vital consideration as it can have a major effect on the physical and mental wellbeing of people in both their homes and their workplaces. LEDs have secured a huge increase in their share of the worldwide lighting market in recent years, as well as being used extensively in TV and other displays.

Although it has long been known that LEDs can be 'piggy-backed' to transmit data to and from mobiles, tablets, sensors and other devices, questions have surrounded the ability to do this without affecting LEDs' core capabilities or the money-saving and 'green' benefits that make

them so popular.

Focusing on LEDs producing 'warm white' and 'cool white' light, the Edinburgh team looked at two different data transmission techniques: on-off keying, where the LED works like Morse code, switching on and off extremely rapidly and imperceptibly to human eyes; and continuous signalling, where imperceptible changes in light intensity are used to achieve the same goal.

Neither technique was found to significantly reduce the lightbulbs' brightness or their life expectancy, or to cause any significant change in the colour of the light. Both techniques also produced only a negligible change in the heat generated by the LEDs – a key consideration as any temperature increase would indicate the LED using more electricity to produce light, making it less energy-efficient and less carbon-friendly.

Dr Popoola adds: "Our ever more connected world will need more bandwidth than the overcrowded Radio Frequency part of the spectrum can provide. Plugging a key knowledge gap, our results are very encouraging for the future of light-based communications that could help realise the full economic and social potential of a wireless future. It's vital that LED manufacturers know what impact the incorporation of data transmission capabilities would have on their products. Our research shows that there's no dark side to using LED lights to supplement WiFi."

Provided by Engineering and Physical Sciences Research Council