

Record communication speeds over ceiling lights

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The Fraunhofer Heinrich Hertz Institute and Siemens achieve transmission speeds of 500 Mbit/s over white LED light

Researchers at Fraunhofer Heinrich Hertz Institute in Berlin together with their Siemens colleagues have scored a peak data rate of 500 megabits per second (Mbit/s) using off-the-shelf LED lights. The new benchmark breaks the previous record they held of 200 Mbit/s. Data transport over visible light is a means of transmission that is license-free, and tap-proof and that opens the way for a range of novel applications in the home, industry and transport.

Researchers at Siemens Corporate Technology in Munich and the Heinrich Hertz Institute set the new free space data transmission record for a distance of up to 5 meters using a white light emitting diode from the Siemens subsidiary Osram. Data were directly modulated from the supply current onto the quantity of light emitted by the LED. The Ostar LED used is one of the brightest now on the market and can be modulated so rapidly that a highspeed data transmission rate of 500 Mbit/s can be achieved while the human eye detects no change in the level of brightness. The receiver is a photodetector that transforms light signals into electrical impulses.

Visible Light Communication (VLC) is a medium that holds out the promise of a wide range of applications. In the home it can be a valuable extension to established WLAN technologies as in many buildings wireless networks are increasingly impeded by clogging of the three independent WLAN frequency bands which leads to collisions between data packets. As a license-free and previously unexploited medium, visible light offers a viable alternative. A further key advantage is that VLC also offers tap-proof secure lines as only the receiver located directly in the light cone can receive the transmitted data, thus precluding any "eavesdropping" on the light beam. In factories and medical technology there is a need for data transmission in places where wireless cannot be deployed or only to a limited extent. Yet another area of application is in the transport domain where LED traffic lights and railway signals can relay information to cars and trains.

The researchers also demonstrated that a network of up to five LEDs is capable of achieving data transmission speeds of up to 100 Mbit/s over a longer distance. This is a critical point for practical applications as, for instance, data from ceiling lights can then be sent to a receiver on a desktop no matter where the desk is positioned in the room. Since 2007 the Institute of Electrical and Electronics Engineers (IEEE) has been working on standardization of the technology in a procedure scheduled for completion by late 2010.

Parts of the research work were conducted within the framework of the EU OMEGA project (www.ict-omega.eu).

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World leaders in the development of mobile and fixed communication networks and their key applications

Founded in 1928, over the course of its more than 80 year history the Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut, has developed into one of the world's leading research institutes for the development of mobile and fixed communication networks and the key technologies that drive them. Today's R&D focus is on electronic imaging and interactive media, communication networks and photonic components.

In 2008 the Institute had an operating budget of approx. 25 million Euro. The ratio of third party funding lay at 76 percent of which 42 came from industry, 31 percent from contract research for the Federal Government and individual State Governments and 22 percent from funding by the European Union. At the beginning of 2009 the Institute had a staff of some 250 employees and some 80 students.

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