



# Principles of LED Light Communications: Towards Networked Li-Fi

*By Svilen Dimitrov, Harald Haas*

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Balancing theoretical analysis and practical advice, this book describes all the underlying principles required to build high performance indoor optical wireless communication (OWC) systems based on visible and infrared light, alongside essential techniques for optimising systems by maximising throughput, reducing hardware complexity and measuring performance effectively. It provides a comprehensive analysis of information rate-, spectral- and power-efficiencies for single and multi-carrier transmission schemes, and a novel analysis of non-linear signal distortion, enabling the use of off-the-shelf LED technology. Other topics covered include cellular network throughput and coverage, static resource partitioning and dynamic interference-aware scheduling, realistic light propagation modelling, OFDM, optical MIMO transmission and nonlinearity modelling. Covering practical techniques for building indoor optical wireless cellular networks supporting multiple users and guidelines for 5G cellular system studies, in addition to physical layer issues, this is an indispensable resource for academic researchers, professional engineers and graduate students working in optical communications.

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#### **About the Author**

Svilen Dimitrov is a researcher at the German Aerospace Center (DLR) in Oberpfaffenhofen, Germany. He is involved as a project manager in the European project on Broadband Access via Integrated Terrestrial and Satellite Systems (BATS), aiming at the development of Terabit/s satellite communication systems with optical feeder links.

Harald Haas is Chair of Mobile Communications at the University of Edinburgh, and Chief Scientific Officer of pureVLC Ltd. He is the inventor of Li-Fi, listed in Time magazine's '50 Best Inventions of 2011', and covered by international media channels such as the BBC, NPR, CNBC, The New York Times, Wired UK, New Scientist, and The Economist. His TED talk on the subject has been viewed nearly one and a half million times, and in 2012 he received a prestigious Fellowship from the Engineering and Physical Sciences Research Council (EPSRC), UK.

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