Optics-2013
OMICS Group Conferences
Accelerating Scientific Discovery
International Conference and Exhibition on
Lasers, Optics & Photonics
October 7-9, 2013 Hilton San Antonio Airport, USA

Free-space optics for high-speed wireless communications in personal area networks

Ke Wang
The University of Melbourne, Australia

Abstract

With broadband connectivity being provided to end users through the widely deployment of passive optical networks, high-speed communications within personal areas are highly demanded. Compared with the wired solution, the wireless choice is preferred due to the added advantage of supporting mobility. Therefore, we have proposed and experimentally demonstrated a novel high-speed wireless communications in personal living/working spaces based on free-space optics (FSO). The proposed system is a combination of limiting mobility and localization function. The localization system has been realized based on FSO as well and it is capable of tens of cm precision. Then a comparatively large signal beam is used to cover the user's position as well as the surrounding areas for limited mobility. MEMS-based steering mirrors are employed to dynamically steer the signal beam based on the localization information to provide full coverage over the entire room. With 7 mW transmission power, which is the maximum allowed according to the laser safety regulations, up to 12.5 Gb/s data transmission has been realized with a maximum error-free (BER of 10^{-9}) beam footprint of ~0.8 m. Theoretical studies has also been carried out and it has been found that one of the major limiting factors is the background light existing in personal areas. To reduce this impact, we have implemented a single channel imaging receiver and >20% improvement has been realized in terms of the maximum error-free beam footprint.

Biography

Ke Wang received the B. S. degree in 2009 from Huazhong University of Science and Technology, Wuhan, China. He is currently working for the Ph.D. degree in National ICT Australia – Victoria Research Laboratory (NICTA-VRL) and The University of Melbourne, Australia. His major research interests include free-space optics for high-speed personal area communications, and free-space based reconfigurable optical interconnects. He has published over 40 papers in top journals and leading international conferences as the first author. He has won several Best Student Paper Awards and he was also one of the recipients of 2012 IEEE Photonics Society Graduate Student Fellowship.