



# Green Radio Communication Networks Applying Radio-over-Fibre Technology for Wireless Access

*Mazin Al Noor*

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Doctoral Thesis / Dissertation from the year 2011 in the subject Engineering - Communication Technology, grade: Pass, Middlesex University in London (School of Engineering and Information Sciences), course: PhD, language: English, comment: Engineering and Information Sciences , abstract: The all-around presence of wireless communication links combined with functions that support mobility will make a roaming person-bound communication network possible in the near future. This idea of a personal network, in which a user has his own communication environment available everywhere. The overall aim of this research project was to simulate the transmission wireless and baseband RF signals via fibre for a long distance in high quality, consuming a low-power budget. Therefore, this thesis demonstrated a green radio communication network and the advantage of transmitting signals via fibre rather than via air. The contributions of this research work were described in the follows: Firstly, a comparison of the power consumption in WiMAX via air and fibre is presented. As shown in the simulation results, the power budget for the transmission of 64 QAM WiMAX IEEE 802.16-2005 via air for a distance of 5km lies at -189.67 dB, whereas for the transmission via RoF for a distance of 140km, the power consumption ranges at 65dB. Through the deployment of a triple symmetrical compensator technique, consisting of SMF, DCF and FBG, the transmission distance of the 54 Mbps WiMAX signal can be increased to 410km without increasing the power budget of 65dB. An amendment of the triple compensator technique to SMF, DCF and CFBG allows a 120Mbps WiMAX signal transmission with a clear RF spectrum of 3.5 GHz and constellation diagram over a fibre length of 792km using a power budget of 192dB. Secondly, the thesis demonstrates a simulation setup for the deployment of more than one wireless system, namely 64 QAM WiMAX IEEE 802.16-2005 and LTE, for a data bit rate of 1Gbps via Wavelength Division Mu

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